July 1962
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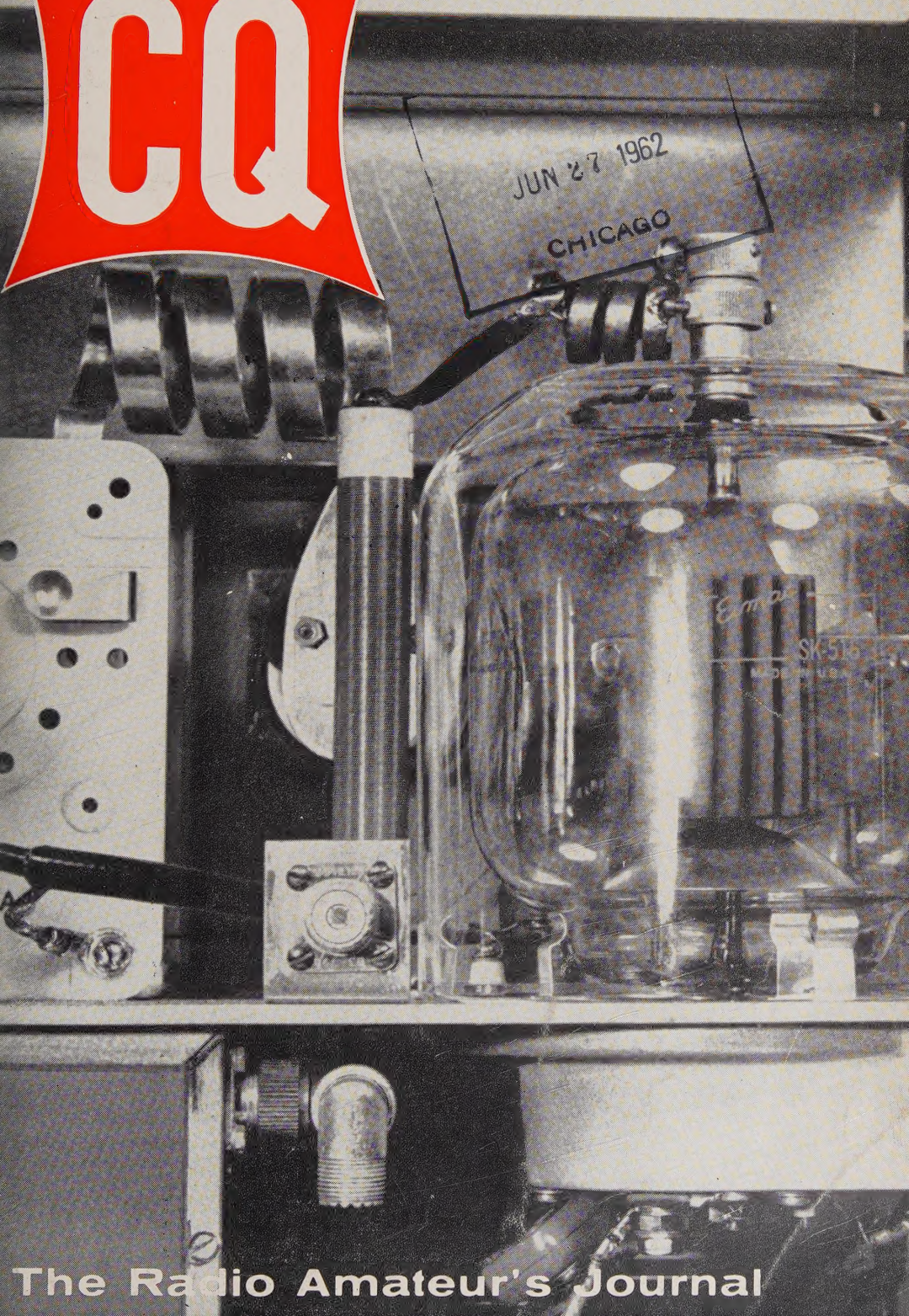
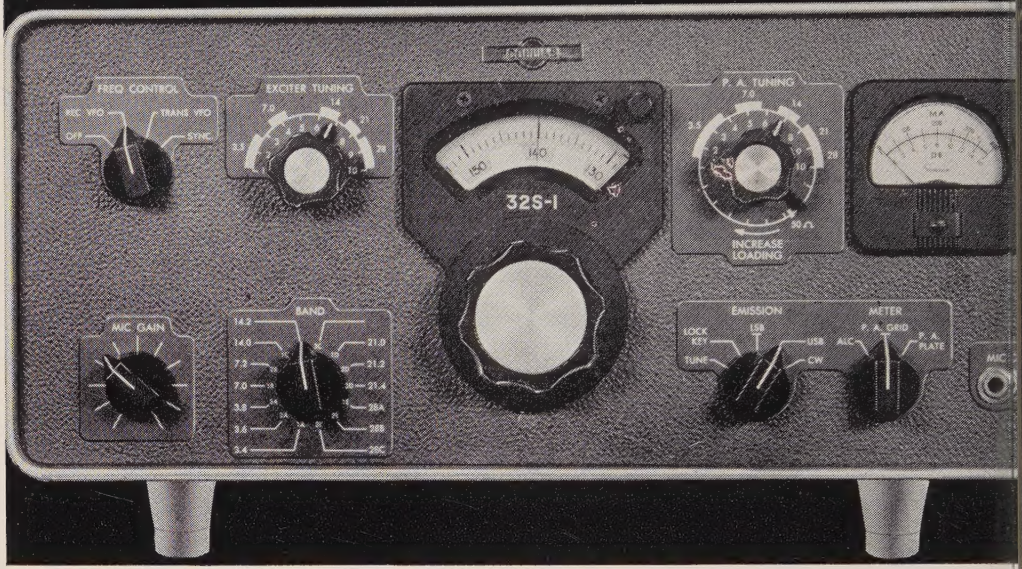
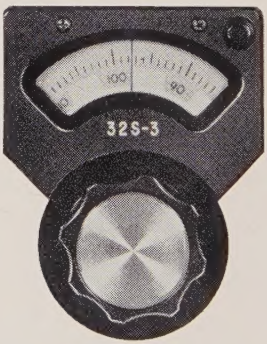
CQ



The Radio Amateur's Journal

How can you improve on the 32S-1 ?





It's the finest transmitter of its kind. An SSB or CW unit with a nominal output of 100 watts, its features include Mechanical Filter-type sideband generation, permeability-tuned VFO, crystal-controlled HF oscillator, RF inverse feedback and automatic load control.

But what if the 32S-1 had these *additional CW* features?

- a new keying method
- spotting control
- a keying hardness control
- side-tone level adjust
- a simpler means of disengaging the crystal oscillator patch cord

You'd have an even finer transmitter.

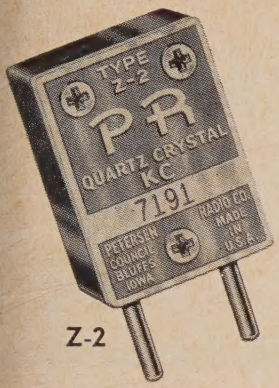
Collins did all these things calls the results 32S-3. It' available in limited quant your distributor in Septe Check with him today for information.

COLLINS

For further information, check number 1, on page 126

Use PR and know where you are!!

No matter where you use them... in SSB exciters... receivers... AM or CW transmitters... in CB transceivers ...wherever circuits call for crystals... PRs are OUTSTANDING!



Z-2

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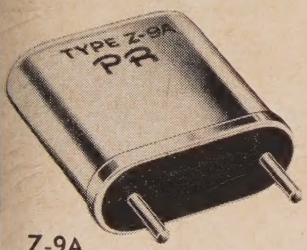

Z-9A

Since 1934, PR Crystals have been the Standard of Quality for Amateurs and Commercials alike. PR Crystals are used in many fields where split-second timing, precision and dependability are vital. They are used in tracking stations of the satellite and missile program, and in many other high precision types of equipment.

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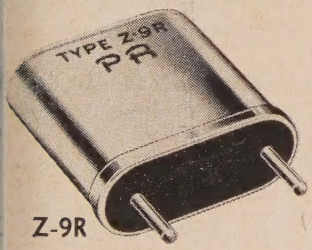

Z-9R

FUNDAMENTAL, PR TYPE Z-2 — Frequency Ranges in Kcs.: 3,500 to 4,000 (80M); 7,000 to 7,425 (40M); 8,000 to 8,222 (2M); 8,334 to 9,000 (6M). ±500 Cycles.....$2.95 Net
(All Z-2 Crystals calibrated with a load capacity of 32 mmfd.)

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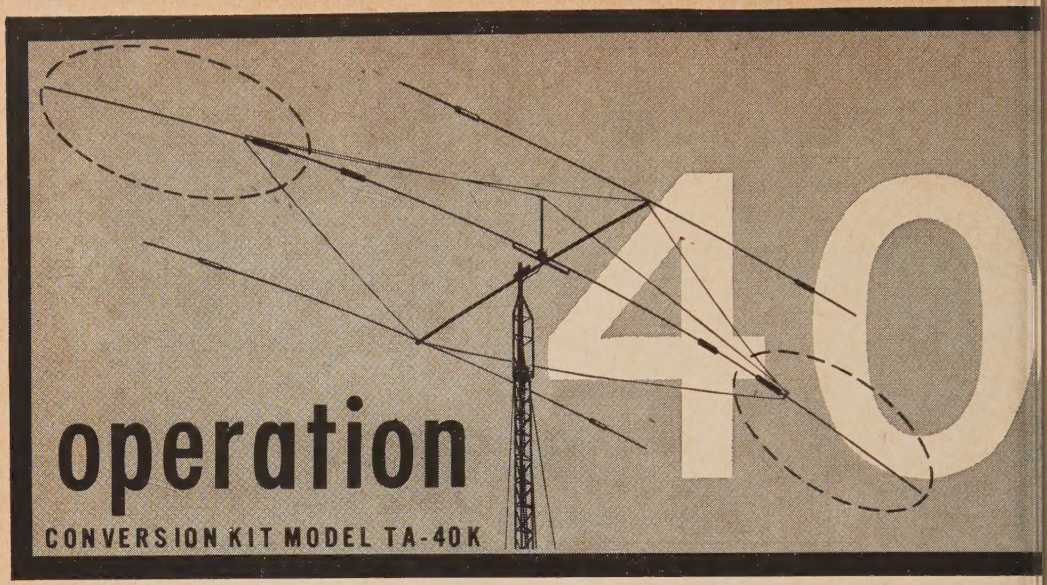
For further information, check number 2, on page 126



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For more information write Mosley Electronics Inc., 4610 N. Lindbergh Blvd., Bridgeton, Missouri

Amateur Net..... $39

SPECIFICATIONS AND PERFORMANCE DATA ON MODEL TA-40K

SWR 1.5/1 or better at resonant frequencies.
Maximum element length 38 ft. 7 in.
Turning radius 19 ft. 6 in.
Assembled weight 10 lbs.
Hardware, mast and line for guying is supplied.
Shipping weight 13 lbs.

Mosley Electronics Inc.

Prices subject to change without notice.

For further information, check number 3, on page 126

CQ The Radio Amateur's Journal

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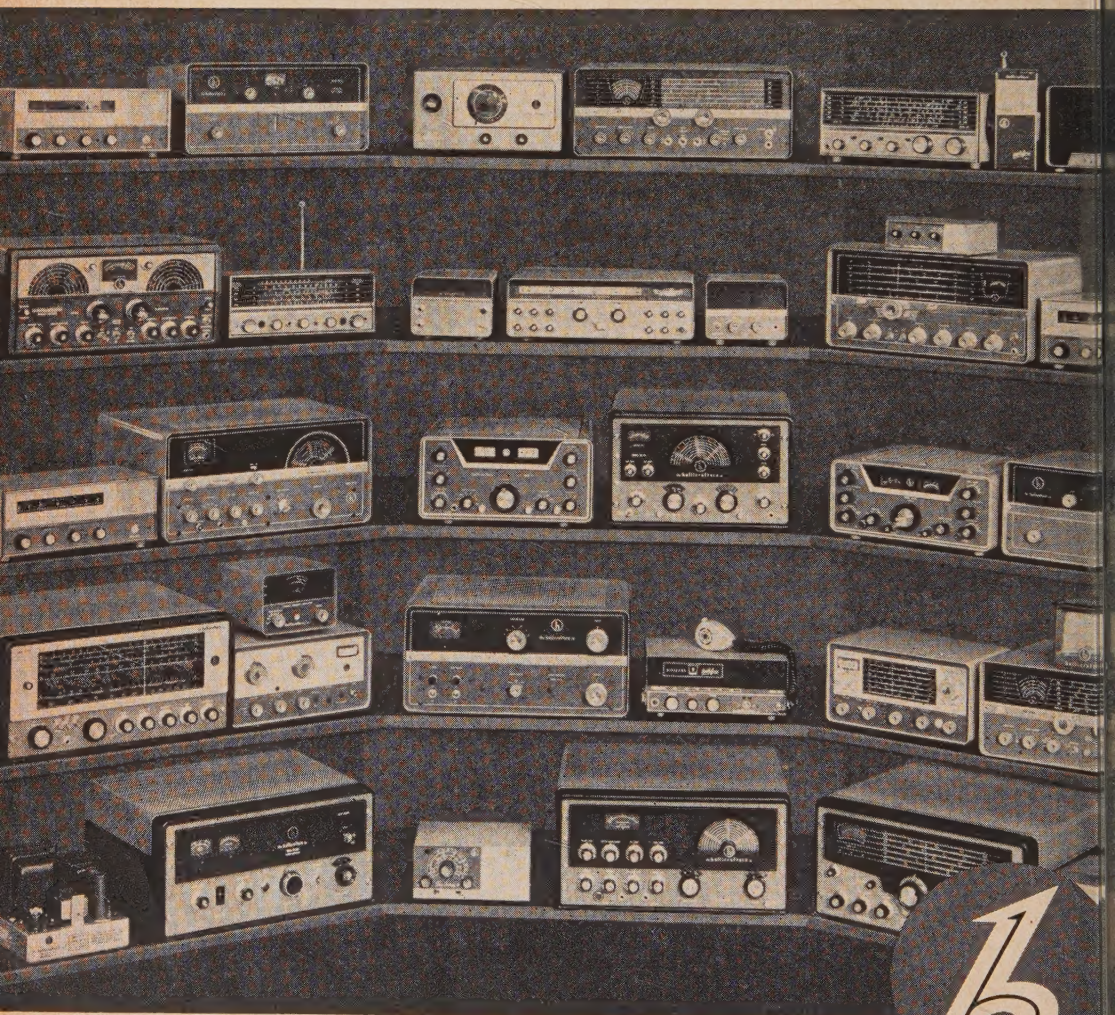

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ZERO BIAS

WE EXTEND our heartiest congratulations and best wishes to the new President of the American Radio Relay League; Herbert C. Hoover, Jr., W6ZH. Elected by Unanimous vote at ARRL's annual Board of Directors meeting on May 11. Herb Hoover replaces Goodwin L. Dosland, WØTSN, who served as ARRL President for the past ten years. Radio amateurs in this country, and indeed, throughout the world, are fortunate that a man of W6ZH's stature will direct and guide them through the trying times that may lie ahead.

Herbert Hoover, Jr., grew up with radio. Born August 4, 1903, a scant two years after Marconi bridged the Atlantic with wireless, Herb built his first receiver at the age of 12, and received his first amateur radio license when he was 15. His early fascination for radio led Herb to the study of engineering. He graduated from Stanford University, California with an engineering degree in 1925, and received a Master's in Business Administration from Harvard in 1928.

Newly-elected President of the American Radio Relay League; Herbert Clark Hoover, Jr., W6ZH.

After graduation, ARRL's newly elected President pioneered the field of air communications. From 1929 to 1934 he built airfields and radio communication systems for a number of fledgling airlines. His interest then shifted to petroleum engineering. Inventing a number of ingenious radio and electronic devices for detecting underground oil deposits soon brought Herb Hoover world-wide fame in this field. He traveled to all parts of the world on petroleum detection missions, and subsequently became a technical consultant for Venezuela, Chile, Peru, Brazil and Iran.

In 1953, Herbert Hoover, Jr. was called upon to assist the Department of State in resolving a very serious petroleum dispute in Iran. Displaying tact and diplomacy, Herb negotiated a satisfactory settlement to the three-year dispute, gaining international acclaim as a statesman. The following year he was named Undersecretary of State, second in command to John Foster Dulles, and served in this post until 1957.

Despite the many heavy responsibilities he has carried through the years, Herb always has managed to find time for amateur radio. Members of the old Washington Radio Club recall the DX experiments he conducted at the Bureau of Standards nearly forty years ago during the time his father was Secretary of Commerce. When his father was serving as the 31st President of this country, W6ZH was active from his own QTH in California. During more recent years, Herb has been active on c.w. and s.s.b., and is well known for his DX-ploits in 160 meters.

Herbert Hoover, Jr., is a distinguished engineer, an accomplished diplomat and statesman, and an active radio amateur. As the newly-elected President of the American Radio Relay League, he takes over the leadership of amateur radio with a rare combination of vast technical knowledge, wisdom, respect, and a keen awareness of the challenges, perils and pitfalls that may be ahead for amateur radio. *CQ* pledges its full cooperation in making W6ZH's new task a success — that of keeping amateur radio strong and healthy.

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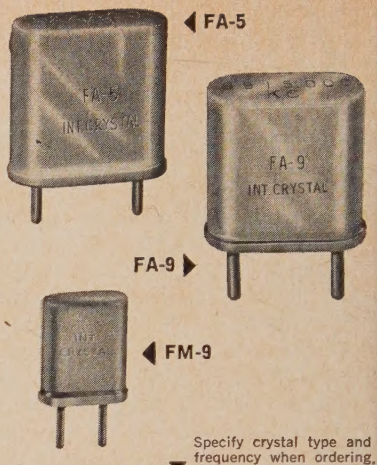

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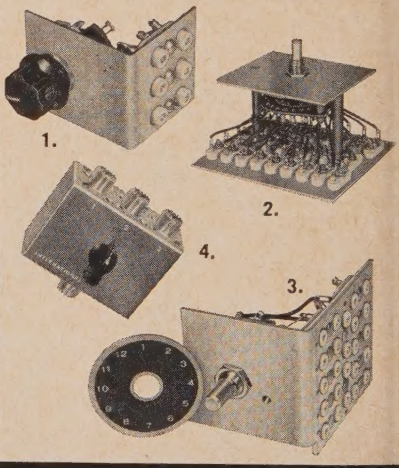

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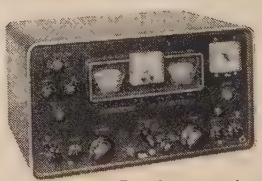

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10-15-20-40-75 METERS

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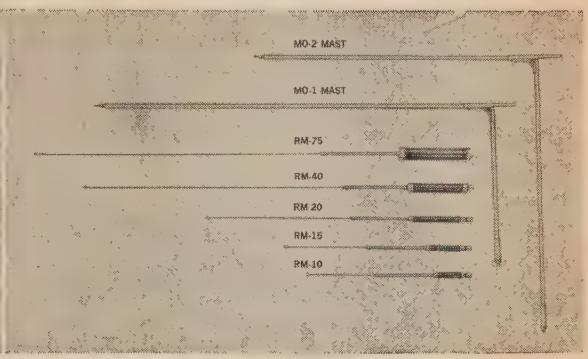

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The 54-inch fold-over, heat treated, ½-inch aluminum mast permits instantaneous interchange of resonators. Mast folds over for garage storage. When opened to full height, the two sections of the permanently hinged mast are held rigidly in position by a shake proof sleeve arrangement. Mast has ⅜-24 base stud to fit all standard mobile mounts. Power rating is 75 watts dc input A.M. — 250 watts PEP input for SSB.

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MO-2	54" Mast folds at 27" from base	(For Bumper Mount)	7.95
RM-10	10 Meter Resonator	Maximum 80" — Minimum 75"	5.95
RM-15	15 Meter Resonator	Maximum 81" — Minimum 76"	6.95
RM-20	20 Meter Resonator	Maximum 83" — Minimum 78"	7.95
RM-40	40 Meter Resonator	Maximum 92" — Minimum 87"	9.95
RM-75	75 Meter Resonator	Maximum 97" — Minimum 91"	11.95

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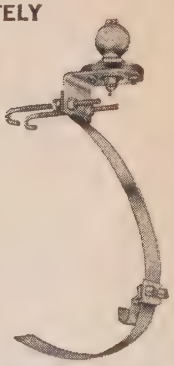

MODEL BM-1 Flat alloy steel strap fits tightly against any shape bumper yet is inconspicuous. Length of strap permits its attachment to both large and small bumpers.

Assembly is held in place by two "J" bolts at the top of the bumper and strap clamp at the bottom. "J" bolts may be inserted between top of bumper and car body where clearance is as low as ¼".

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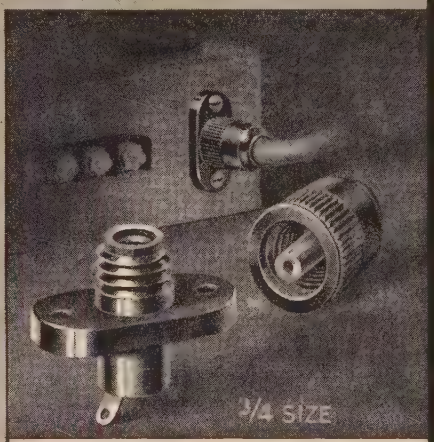

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Letters..... to the Editor

L.F. & V.L.F.

Editor, *CQ:*

Reference your story by W2GFR on l.f. and v.l.f. in May 1962 issue. There is undoubtedly room for amateur experimentation on all fronts, let alone the example given. The art might well be served by opening the 30 kc - 40 kc band to amateur operation in view of the apparent lack of activity over the years in that area by other services.

R. A. Hilferty, W2HEF
P. O. Box 409
Miller Place, L.I., N.Y.

Editor, *CQ:*

W2GFR's suggestions on l.f. underwater antennas are interesting. A glance at an old physics text authments his article. The velocity of light (hence an electromagnetic radiation) in water is ¾ that of in free-space velocity. Thus, a formula for element spacing can be corrected for submarine use by simply multiplying by 0.75.

There probably exists a difference between fresh and salt water.

Bob Russ, KØGKK
Blue Earth, Minn.

Lawful & Ethical

Editor, *CQ*

Enjoyed reading "Lawful & Ethical Procedures Applying to Radiotelephone Operation" by W5EHC in *CQ* for April.

I noticed a couple of errors however. The author says (in question 14) if transmissions are less than two minutes duration call signs of only the station transmitting be given every ten minutes. This is not true! Careful examination of section 12.82 (*a*) (ii) will show that *both* call signs must be given; i.e. the call of the station being communicated with and the call of the station transmitting.

Also question #19. The author says that the lowest frequency for remote-control operation is 420 mc. Wrong again! Section 12.64 of the FCC rules and regulations states: ". . . the controlling transmitter . . . the remote control location will operate within amateur frequency bands 220 megacycles or higher. . ." (If my memory is correct, an *old* limitation was 420 mc but was changed on Jan. 3, 1961 to the present limitation of 220 mc.)

I enjoy these articles very much—would like to see more of them.

Richard A. Golden, K8LOC
18960 Wisconsin Avenue
Detroit 21, Mich.

Re: Patching

Editor, *CQ:*

Your timely and provocative editorial for May dealing with phone-patching moves this reader to applaud this slight effort to part the ever present curtain that shrouds most controversial subjects which concern Amateur Radio.

We consider phone-patching as controversial since it is by no means universally accepted as a way of life within our ranks. Over the years, amateurs have performed herculean tasks of emergency communications and, without the aid of phone-patching for the most part.

Except where communications are non-existent, due either to isolation or disruption of normal services due to natural causes, phone-patching-à la New York

◀ For further information, check number 10, on page 121

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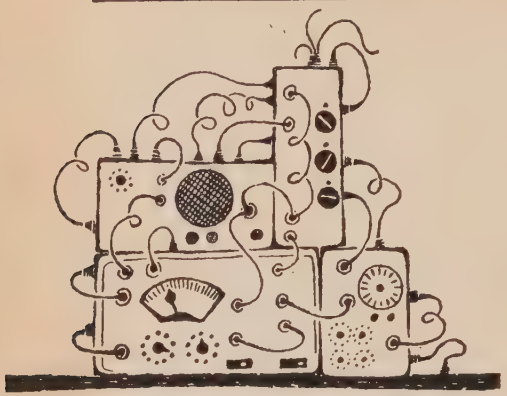

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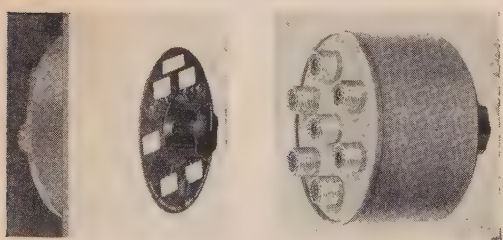

COAXIAL SELECTOR SWITCH — MODEL 335

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For further information, check number 12, on page 126

to Miami Beach—is a violation of our basic concept for occupying frequencies conservatively valued at 8 billions of dollars.

To deny that an amateur is not in direct competition with telephone and telegraph companies when he patches between metropolitan areas within the continental boundaries of the United States, is like saying that the product of an illicit still is o.k. because it tastes nearly as good as that turned out by a legal and licensed distillery, and it's cheaper!

Quite naturally we do not expect agreement to this way of thinking from the amateur who patches his boss into his brother-sister-parents-children come every Sunday morning. We do solicit the contemplation of those amateurs of some maturity and operational experience that have noted in the past, that in cases where commercial interest and amateur activity collide, the amateur almost always comes off the loser. To consider phone-patching in a litigious sense of the amateur *vs.* AT&T is sheer folly. The legality of the amateur's position is a jillion miles from even border line.

The fact that almost all patch installations at the amateur station site are done without the telephone companies knowledge is generally accepted. This by itself, is a direct violation to the laws of most states. Something to do with . . . "foreign attachments to the company's instrument, etc." . . . So from this beginning, already illegal before it's initial use, we set out to get that "clear channel." . . .

Amateur Radio may be deserving of increasingly favorable consideration at future International conferences based upon their demonstrated ability to perform when all other services collapse; but can this Utopian state come to view if we continue to highlight only our virtues while assuming the attitude of Janus to our faults?

Your editorial amplifies the importance phone-patching takes on when viewed from "a distant shore." To this we heartily agree; but it is because of this valued service, and the continuance of same, that concerns us on the domestic scene. Continued abuses at home will, to be sure, have it's bearing on whether patching can be carried on from afar.

We do not condone the League's apparent indifference to what we consider a threat to the Art. But your editorial does not seem to take into account that there is no possible way that phone-patching can be made legal by an amateur station. For to become legal, there now enters into the picture the factor in the form of the Public. The phone-patch user whether he be your boss, your TVI-enduring neighbor, and/or plain John Q. Public is a protected element in the over all picture. By protected, we mean that laws keep him, supposedly, from being bilked by legally operated communications and transportation facilities. Yes, we know the amateur receives nothing for his "services" be it patching or what have you . . . yet, when is he, the amateur, legal, and when is he merely an accomodating neighbor? He cannot be both!

Operators of public service, telephone, telegraph or street cars must meet standards to continue business. Failing this they lose their legal right to maintain their franchises. If a legalized phone-patching amateur cannot produce a patch for any member of the tax-paying public—protected, as he is,—does this failure mean he loses his franchise? Also, if he is a legal patcher can he exclude anyone from his services? Can he afford patches only to his boss, etc.? If patches are made legal where does the responsibility of the amateur begin and end?

That you are aware of the . . . "Flagrant abuse and misuse of nuisance patching" . . . is a too-long delayed recognization of this amateur anarchy now passing under the title of "patching." If ever a society asked for restrictions and further curtailments of our enjoyment of a "good thing," we are that body when we place ourselves in the position of begging attention to our conduct in the matter of "nuisance" patching.

The amateur cannot expect too wide a discussion of the patching matter in their fraternal organ, the Amateur *Pravda,* simply because matters of controversary are ignored. Rather it seems, if

New! "Valiant II"

uilt-in provisions for use with SSB pter . . . increased communications er . . . VFO designed for outstanding bility so vital to SSB operation!

estyled—and offering many new operating and performance features, liant II" gives you outstanding flexibility and performance in a com- sk-top rig! Completely bandswitching 160 through 10 meters— a full 275 watts input CW or SSB (with auxiliary SSB exciter or the king SSB Adapter) and 200 watts AM! Low level audio clipping s overmodulation and increases modulation level and intelligibility reased communications power. Differentially temperature com- d VFO operates in the 1.75 to 2 mc. and 7.0 to 7.45 mc. ranges— s the extreme stability necessary for peak SSB operation. High y pi-network tank circuit will match loads from 50 to 600 ohms and t large amounts of reactance—final tank coil is silver-plated. Other : complete TVI suppression; timed sequence (grid block) keying; in push-to-talk audio system for use with high impedance crystal or c microphones; built-in low pass audio filter; self-contained power and single control mode switching.

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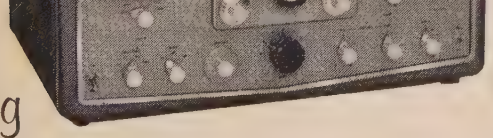

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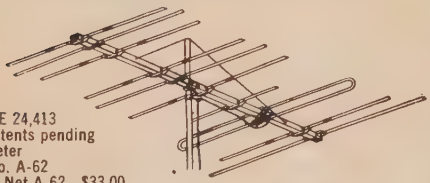

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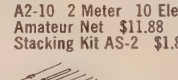

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For further information, check number 14, on page 126

history is a true indicator, ARRL will await the commercial telephone and telegraph interests to request FCC to slap us down. We also hope that amateur radio will not take on a competitive role with the commercial communications interests; however, the final judge of the degree and effect of any such competition by way of phone-patching, will not, unfortunately, be left in the hands of the ARRL or any of its members.

Len Collett, KZ5LC
Box 736, Balboa, Canal Zone

[*Editors Note:* OM Collett, as WØDEA, held the office of Midwest Division Director from 1948 to 1951.]

Indiana R.C.C.

The Indiana Radio Club Council Hamfest will be held Friday, July 15 at Highland Park, Kokomo, Ind. beginning at 10 A.M. Betty Timberlake, W9LYU is handling pre-registrations; her QTH is 1109 Logan, Lafayette, Indiana.

Wisconsin

If you're a member of the Flying Ham's Club you may want to fly to the hamfest sponsored by the Wisconsin Nets Association to be held on July 8th. Easle Park is the place and Hartford, Wisconsin is the location. Registration starts at 9 A.M. and the airstrip is right on location. Details can be obtained by writing Mrs. W9VIK, 610 Wisconsin Ave., North Fond du Lac, Wisconsin.

Maryland

The Aberdeen Lodge #1450 of the Loyal Order of Moose will be the spot for the 7th Annual Graveyard Net picnic commencing July 28th. Banquet, dance and loads of prizes the 29th. K3LXN, Box 145, Havre de Grace, Maryland is handling the chores on this one.

Montana

The Glacier-Waterton International Peace Park Hamfest will be held in Glacier National Park at the Apgar campgrounds on July 20-22. They expect a large turnout because of the many amateurs in the vicinity of the Seattle World's Fair. W7QCY will help you out with the incidentals.

March of Dimes

The Copper Country R.A.C. is pleased to announce that during a recent Telethon, members of the club transmitted 583 pledges totaling over $2,100. Members who participated were: *W8*GOW, IDN, IQA, NCQ, NEX, *K8*IJQ, UKW, UYX, VOA and *WN8*AFN. *Good Show!*

New Jersey

The East Coast V.H.F. Society's 4th Annual Hamfest will be held Sunday August 5th at Saddle Brook Park, Saddle Brook, N.J. starting at 10 A.M. Radio facilities will be available to monitor 10, 6 and 2 for mobile visitors. No registration fee and parking is gratis.

A little bit further south, near Glen Gardner N.J. will be the site for the Central N.J. V.H.F. Society's 2nd Annual hamfest, July 29. Voorhees State Park, off route 513 is the place. Gates open at 10 A.M. and K2MPD will fill you in with incidentals. Telephone EL 6-4628.

Colorado

The Denver Radio Club is sponsoring this year's ARRL Rocky Mountain Division convention to be held at the Brown Palace Hotel on July 21-22. The usual technical talks, banquet and dance are included. July 9th is the pre-registration cut-off date to get your

[continued on page 116]

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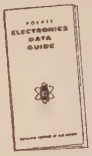

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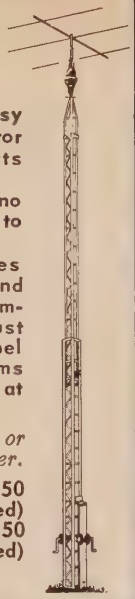

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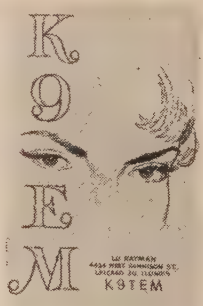
QSL contes

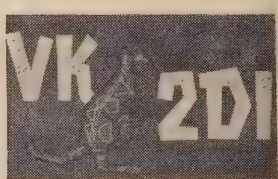
THE QSL card winner this month is W5UKQ with a very nice two-color card in red and black. Runners up are W6WY, K9IEM and VK2DI.

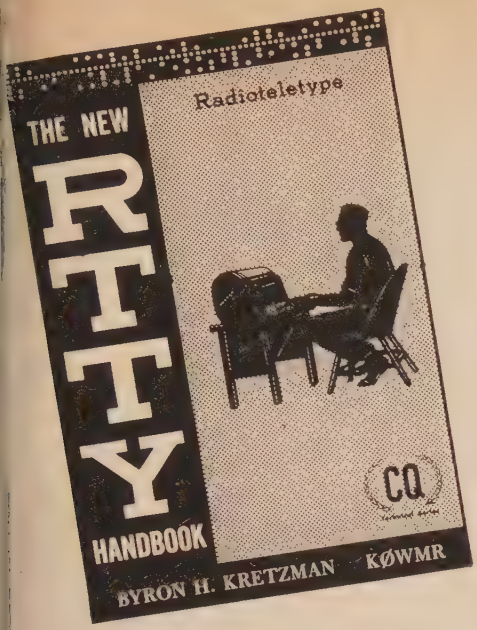
Honorable mention also goes to K1OTY, K6BNJ, WA6GCP, K8AZI, W9DBR, HC2HP, SM7CII, VK2AMH and VK3TL.

Since we receive a great number of "one of a kind" cards, it is best we restate that hand-drawn, hand-colored cards are not acceptable.

Runners Up







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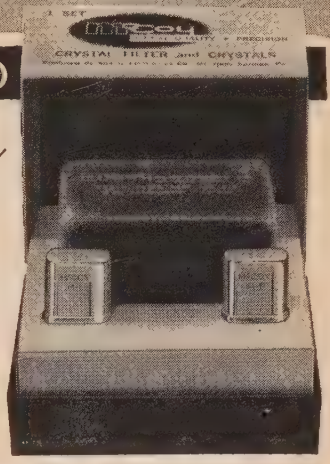
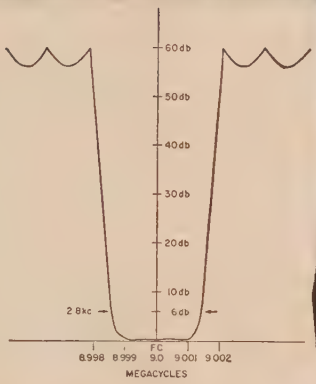
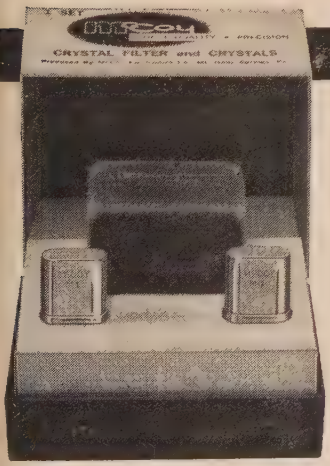
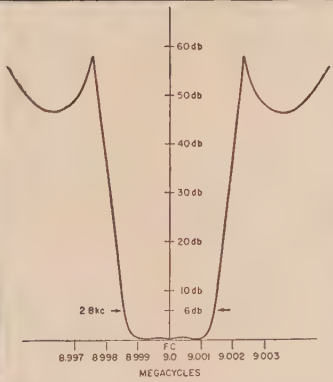


TECHNICAL DATA
Impedance: 640 Ohms in and out (unbalanced to ground)
Unwanted Side Band Rejection: Greater than 55db
Passband Ripple: ± .5db
Shape factor: 6 to 20db 1.15 to 1
Shape factor: 6 to 50db 1.44 to 1
Package Size: 2 7/16" x 1 19/32" x 1"
Price: $42.95 Each



The SILVER SENTINEL (32B1)





TECHNICAL DATA
Impedance: 560 Ohms in and out
Unwanted Side Band Rejection: Greater than 40db
Passband Ripple: ± .5db
Shape factor: 6 to 20db 1.21 to 1
Shape factor: 6 to 50db 1.56 to 1
Package Size: 1¾" x 1¼" x 1"
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For further information, check number 17, on page 126

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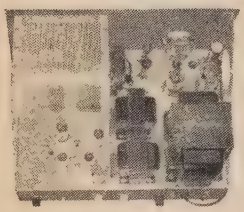

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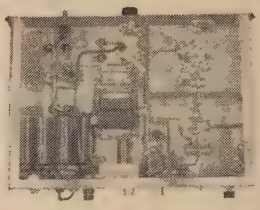

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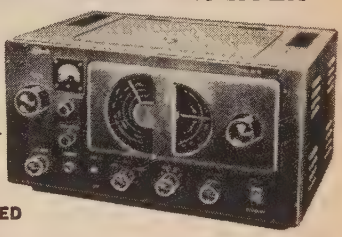

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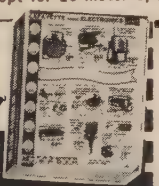

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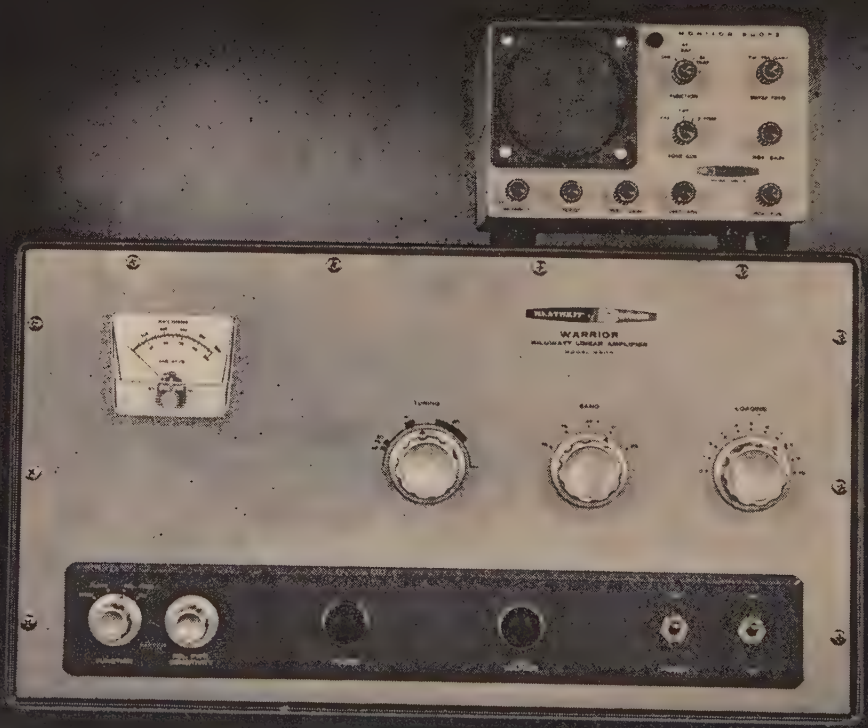

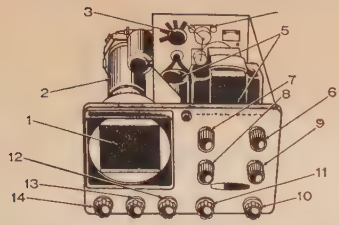

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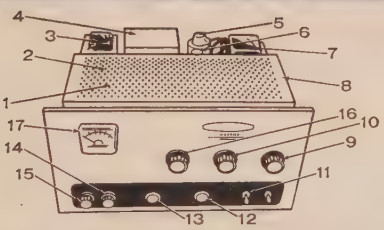

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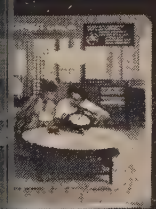

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The V.H.F. Panadaptor

BY RICHARD O. GIBSON*, W8TTY

This panoramic adapter is suitable for use on the v.h.f. bands. It has a maximum bandwidth of 2 mc and one adjustable band and two fixed bands can be selected. It is intended for use with broadband converters whose i.f. is from 7 to 11 mc.

CAN a panadaptor help the v.h.f. man? This question came to mind while I was carrying on a QSO with my friend, Jim, W8DAU. The 2 meter band was in good shape so I mentioned to Jim that we might break and tune around. When Jim came back he mentioned that it would be very nice to have a panadaptor to cover the v.h.f. bands. He said he had purchased a commercial panadaptor, but that the band width of 250 kc was too narrow to really tell what was going on.

During the ensuing conversation it was decided that it would be advantageous to have a simple, efficient panadaptor which would cover a large segment of any v.h.f. band. The unit to be described in this article was developed to meet these requirements. This unit will cover up to 2 mc of any v.h.f. band on a 3" display tube. It has a variable tuned sweep range with variable sweep width (0-2mc) and also 2 fixed bands which may be set to cover any frequency and sweep width within the range of the unit.

This unit is designed to work with broad band crystal controlled v.h.f. converters whose i.f. range is 7-11 mc but could be modified for use with converters having other i.f. ranges. Since the r.f. for this unit is obtained ahead of the tunable i.f., the unit does not tune with the receiver. This allows a check of any portion of the band at any time. Any readable a.m. phone signal can be seen on the scope.

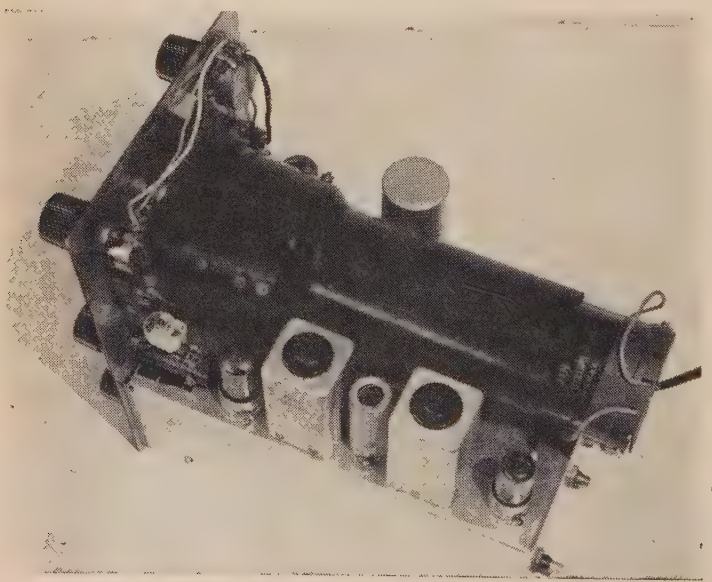
The unit was kept as simple as possible consistent with good results.

*7700 Cubbage Road, Westerville, R.D. #3, Ohio

Circuit Description

You can forget all about sweep oscillators, sweep amplifiers, reactance tubes and complicated high voltage supplies when building this unit.

Only 5 tubes including the 3BP1 c.r.t. are used in the unit. Saw tooth horizontal sweep is obtained from the a.c. line through the clipping and integrating circuit consisting of CR_1-C_1 and R_1. A sample of this sweep voltage whose amplitude is dependent upon the SWEEP WIDTH controls is fed to diode CRC_1, whose capacitance is proportional to the amount of



Three quarter view of the panoramic adaptor. The 6BA6, V_1, is just visible behind the c.r.t. shield. The 6BR8, V_2, is on this side of the c.r.t. just to the right of L_4, the tuning coil, and is followed by V_3 and V_4. The mu-metal shield for the 3BP1 was salvaged from a surplus radar scope, but one of the Millen units would do as well. I.f. transformers T_2 and T_3 are from a BC-454 receiver.

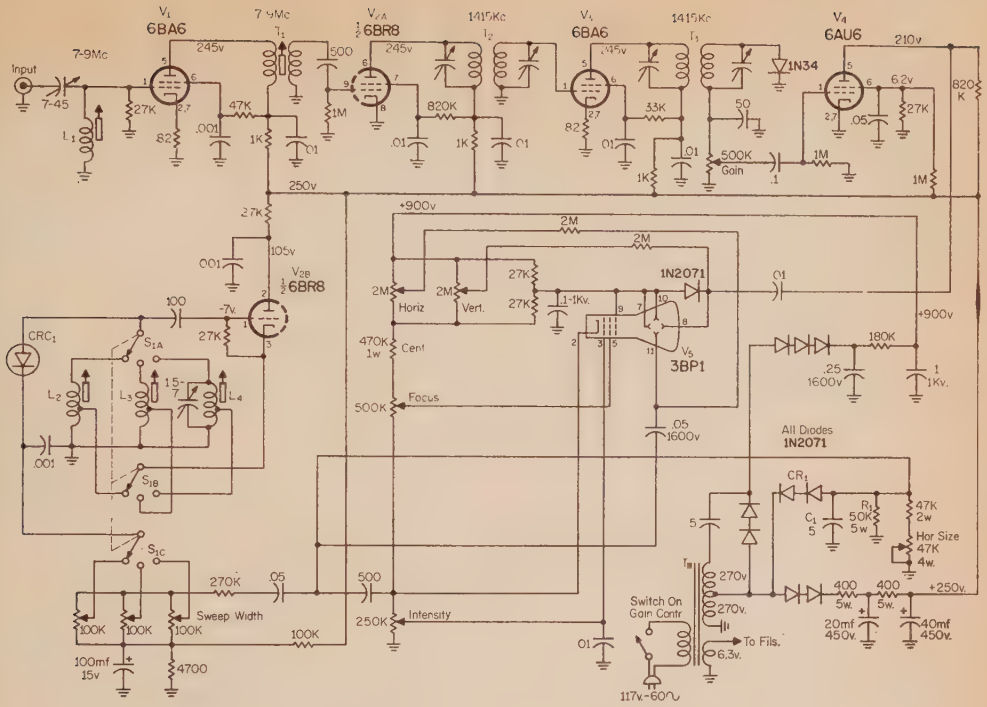


Fig. 1—Circuit diagram of the panoramic adaptor for use in the v.h.f. bands. All resistors are ½ watt and all capacitors are rated at 600 v unless otherwise noted.

CRC_1—V-56 semicap. Pacific Semiconductor.
L_1—45t #28 on a ⅜" form with iron slug.
L_2—40t #30 tapped 10t up on a ¼" form with iron slug.
L_3—30t #30 tapped 8t up on a ¼" form with iron slug.
L_4—16t #28 tapped 3t up on ½" form with iron slug.
T_1—Pri, 45t #30; Sec, 30t #30 over primary on ⅜" form with iron slug.
T_2, T_3—1415 kc i.f. transformers from ARC-5 receiver.
T_4—540 v.c.t. at 70 ma, 6.3 v at 3 amps.

voltage across it. Since this diode is part of the local oscillator tank circuit, the local oscillator is swept in frequency as the beam is swept across the face of the c.r.t. (Simple, isn't it?)

The bandswitch selects the proper inductances and sweep voltages to provide the desired fixed band frequencies and widths. The original model, shown in the photographs had one fixed and one tunable band but was later modified for two fixed bands.

One broad band r.f. stage and one 1415 kc i.f. stage provide all the gain necessary and video amplification is handled by a single 6AU6. High voltage is obtained by the unusual power transformer connection.

Construction

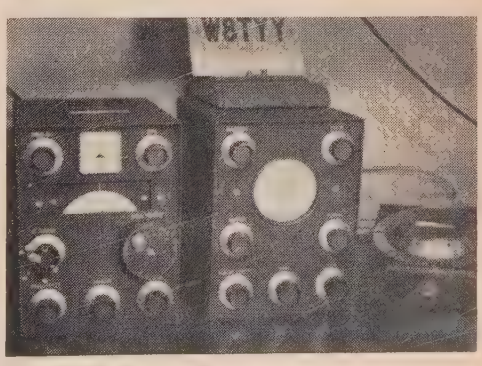
This unit was built in a surplus BC-906 frequency meter case but could be constructed to suit the builder. The layout is straightforward around the 6×9×3 inch chassis which is a cut down from a standard 6×17×3 chassis.

The c.r.t. shield and socket were salvaged from a surplus 3" radar indicator and the i.f. cans are from an ARC-5 receiver.

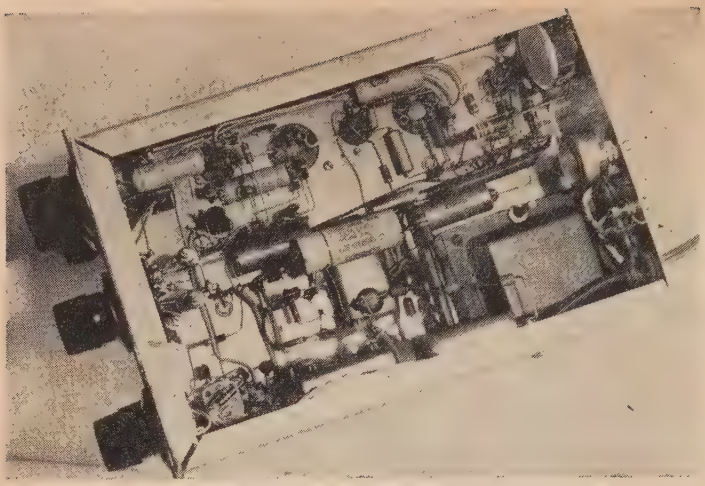
The photos provide a general layout which can be followed if desired.

Alignment and Operation

After the unit is wired and the usual voltage checks have been made, advance the BRILLIANCE control until a line appears on the face of the c.r.t. Adjust HORIZONTAL CENTERING, FOCUS, and BRILLIANCE controls for a reasonably sharp line on scope. The VERTICAL CENTERING con-



The v.h.f. Panadaptor at the operation position of W8TTY. The unit is used in conjunction with the modified Command Set receiver at the left. Controls are: (clockwise from upper right) Focus, Tuning, Gain, Band, Sweep Width, Marker and Intensity. The Marker control was included in anticipation of a marker system not yet developed.



Bottom view of the v.h.f panadaptor. The power transformer is mounted with the bulk under the chassis in order to clear the c.r.t. above the chassis. The 7-45 mmf input tuning capacitor may be seen in the lower left corner near V_1. The two centering pots are mounted to the right of V_1 but one is blocked from view by the capacitors. The components on the rear panel are, from top to bottom, Horizontal Size, Fixed Bandwidth, and input.

trol will have an effect over approximately ½ of its range. Set the VERTICAL CENTERING control to approximate center of this active range.

Now align the 1415 kc i.f. using signal generator input to the mixer grid and a v.t.v.m. probe on high side of gain control. Tune for maximum negative voltage.

At this time, it should be possible to get a pip on the scope. Set the BAND selector to V.F.O., SWEEP WIDTH to the center of its range and set the gain at maximum. Now connect the signal generator to the mixer grid through a 3 mmf capacitor or "gimmick" and tune generator around 6 to 10 mc while observing the scope for pips. Using the lowest generator output possible, adjust the v.f.o. and fixed band oscillators along with the associated SWEEP WIDTH controls for the desired band coverages. Watch out for images and harmonics here!

Next, move signal generator to r.f. input and align the r.f. and mixer coils for uniform response across the 7-9 mc band.

Now connect the panadaptor to the converter and repeak both units for uniform response. It should be possible to get at least ¼" of "grass" on the scope if the converter has reasonable gain.

Adjust the vertical centering control to just clip the bottom of the "grass." The unit is now ready to eliminate a lot of band tuning and after getting used to it you will wonder how you got along without it! ■

12th Annual ARRL Convention

Portland, Oregon, Sept. 1, 2, 3.

THE Memorial Coliseum in Portland, Oregon will be headquarters for the forthcoming 12th Annual A.R.R.L. Convention to be held September 1, 2, 3. This convention will no doubt draw a great many amateurs from all over the world and the Convention Committee has made arrangements with a number of local hotels and motels for accommodations.

Advance registration is $4.75 for licensed amateurs and $2.75 for non-amateurs. A dollar extra will be charged if your application is received after July 15th.

Program

SATURDAY; *Morning;* Registration, Coffee Shop QSOs, Motion Pictures, Special features. *Afternoon;* Opening Luncheon, Official Welcome to City, A.R.R.L. Officials, Exhibit Hall and Swap Shop, Technical Discussions, Experimenters, Fashion Show—Lloyd Shopping Center, Shopping Tour—World's Largest Shopping Center for YLs. *Evening;* Technical Topics, Dance-Entertainment, Wouff Hong Initiation, Y.L.R.L. Dinner and Forum.

SUNDAY; *Morning;* Group Breakfasts—RTTY, DXCC; Oregon Emergency Net, Novice, YL Church Services, Ladies Group Breakfast YL and XYL. *Afternoon;* Group Luncheons and Discussions, MARS-DXCC, Mobile Exhibit & Field Strength Competition, Exhibit Hall and Swap Shop, Movies, Technical General Interest and DXpeditions, Special Ladies Luncheon with Recognized Authority on Northwest Lore as speaker. *Evening:* Dinners, Special Interest Groups, A.R.R.L. Meeting, MARS Presentation, FCC, Exhibit Hall and Swap Shop, Ladies Dinner—Surprise Speaker and Awards.

MONDAY; *Morning;* Group Breakfasts—s.s.b., v.h.f., c.w., Q.C.W.A., Mobile Hidden Transmitter Hunt, Tour to O.M.S.I. and Radar Picket Destroyer in harbor, c.w. Competition, Exhibit Hall and Swap Shop, Ladies Breakfast, SWOOP Initiation. *Afternoon;* Group Interest Luncheons, New Products and Future Developments, Technical Discussions and Talks, Exhibit Hall and Swap Shop. *Evening;* Awards Banquet, Prizes, Featured Speaker: Rear Adm. Bernard F. Roeder, Director of Naval Communications.

If the above program isn't enough to keep you hopping over the Labor Day weekend, the "Century 21" exhibition at the Seattle World's Fair is but a two hour drive or 25 minute flight by plane. Bring the entire family—and enjoy the hospitality of Portland, the "City of Roses." Address all inquiries to: 1962 A.R.R.L. Convention, P.O. Box 1335, Portland 1, Oregon.

Harmonic Crystal Oscillator Design

BY IRVING B. MICKEY*, W2LCB

The data presented here is the result of extensive tests performed by the author using four of today's more popular tube types in three conventional oscillator circuits. Amateur and engineer alike will appreciate the practical volue of such information.

EVERY amateur who designs his own transmitters has undoubtedly devoted more than a little time to the problem of choosing oscillator tubes or circuits. The fact that this poses a problem is not at all surprising. While there is an abundance of literature available on the basic design and operation of oscillators, there has been almost nothing published in recent years to show how *one* circuit or tube stacks up against another in actual operation. An excellent article on this subject appeared in 1950, but subsequent advancements in tube design have rendered much of this data obsolete.[1]

After wrestling with this problem on paper on innumerable occasions, the author finally decided to attack it with more substantial weapons. This entailed actual trial of several of the better modern oscillator tubes in each of the three common harmonic oscillator circuits. Relative output at three different harmonic levels was measured in terms of grid current in a partially operative stage following the oscillator.

*1247 Baker Avenue, Schenectady 9, N.Y.

[1]Chambers, V., "Crystal Controlled Oscillators," *QST*, March, 1950, p. 28.

The Test Circuits

The circuits employed in the test series, the Tri-tet, the Colpitts or grid-plate, and the modified Pierce, are shown in figs. 1ABC, respectively. Figure 1A also shows the 5763 which followed the oscillator in each case and which might, in a practical application, be either a straight-through amplifier or a frequency multiplier. For this purpose, its filament was lighted, but neither plate nor screen voltage was applied.

Tubes used in each circuit were the 12BV7, 6CL6, 6AG7, and 5763. Although not normally encountered in transmitting equipment, the first of these is electrically very similar to and physically interchangeable with the more common 12BY7. It was selected because of its extremely

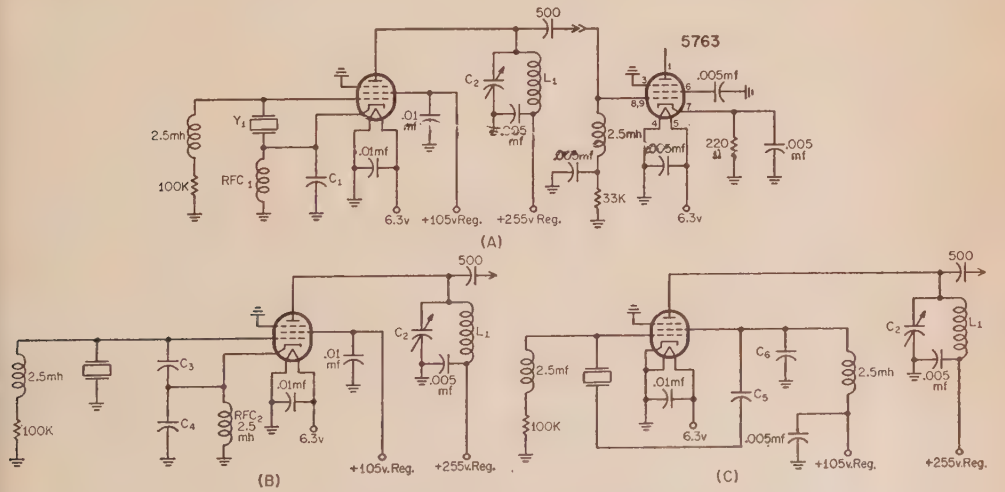


Fig. 1A—Circuit of the Tri-tet oscillator. (B)—Circuit of the Colpitts or Grid-plate oscillator. (C)—Circuit of the modified Pierce oscillator. The 5763 "amplifier" stage is the same for all tests; no screen or plate voltage is applied to this tube.

C_1-RFC_1—Tuned to approximately 12 mc.
C_2-L_1—Tuned to 2nd, 3rd or 4th harmonic using a separate coil for each.
C_3—10 mmf for all tests.
C_4—60 mmf for 12BV7, 6CL6 and 6AG7. Use 40 mmf for 5763.
C_5—.001.
C_6—22 mmf for 12BV7 and 6CL6; 10 mmf for 6AG7 and 5763. (see text).

high mutual conductance (G_m), a point which will enter into the discussion a little later.

Ideally, several tubes of each kind would have been tried in each test setup and the results averaged out. Unfortunately, these are fairly expensive types and did not happen to be available in quantity. To compensate in part for this deficiency, two important control measures were introduced into the tests: (1) the tubes used were all brand new and were picked for exactly normal readings on a good dynamic mutual conductance tester; and (2) regulated voltages were used on the screen and plate of the oscillator.

The crystal used in all cases was a surplus 8350 kc rock of known reliability. It was chosen for three reasons: (1) the harmonics at which measurements were taken fairly well bracket our topmost low frequency bands; (2) this region is high enough in frequency to reveal any serious drop-off in tube performance; and (3) the third harmonic falls at a convenient spot for further multiplication to the v.h.f. bands.

Circuit Theory

Although we are mainly concerned here with practical applications, a few theoretical points must be understood in order to appreciate the test results in Table I. The first is that each of these "oscillator" circuits is really an electron coupled oscillator-multiplier combination. The screen grid of the tube serves as the "plate" of the oscillator section, while frequency multiplication takes place in the actual plate circuit. This automatically provides some isolation between the load and the frequency determining element.

Table I

Tube Type	*Osc. Type*	*Harmonic*	*Amp. Grid Ma*	*Osc. Scr. Ma*	*Osc. Plate Ma*
12BV7	Tri-tet	2	4.03	1.80	8.20
		3	3.30	1.79	8.61
		4	2.23	1.70	8.65
	Colpitts	2	3.64	1.58	7.00
		3	2.95	1.46	7.04
		4	2.21	1.42	7.32
	Mod. Pierce	2	3.85	2.12	10.20
		3	2.19	2.08	11.00
		4	0.99	1.89	10.30
6CL6	Tri-tet	2	3.90	2.14	8.05
		3	3.01	2.11	8.61
		4	1.98	1.91	8.42
	Colpitts	2	3.48	1.84	6.98
		3	2.81	1.76	7.08
		4	2.02	1.69	7.35
	Mod. Pierce	2	3.62	2.40	10.00
		3	1.78	2.25	10.50
		4	0.80	2.04	10.00
6AG7	Tri-tet	2	3.79	2.10	7.61
		3	2.88	2.07	8.01
		4	1.95	1.98	7.98
	Colpitts	2	3.42	1.92	6.80
		3	2.78	1.84	6.95
		4	1.98	1.79	7.02
	Mod. Pierce	2	3.20	1.89	7.60
		3	1.95	1.84	7.98
		4	0.97	1.79	7.82
5763	Tri-tet	2	3.80	0.81	9.52
		3	2.49	0.61	10.50
		4	1.40	0.50	10.00
	Colpitts	2	3.39	0.52	7.61
		3	2.48	0.40	7.91
		4	1.71	0.36	8.05
	Mod. Pierce	2	0.95	1.21	17.20
		3	0.22	0.90	13.20
		4	0.00	0.87	13.20

While oscillation is easily sustained in all of the circuits using these tubes, feedback adjustments are somewhat critical if maximum output at a particular harmonic is desired. Feedback is controlled in the Tri-tet by the tuning of the cathode tank, C_1-RFC_1, in the Colpitts by the values of C_3 and C_4, and in modified Pierce by the value of C_6. More about these in a moment.

Generally speaking, the higher the mutual conductance of the oscillator tube, the higher the harmonic output. This rule of thumb, however, begins to break down when older, less efficient tubes are employed at relatively high frequencies.

Performance with each circuit is also improved by using a relatively high L/C ratio in the output tank (in other words, a low value of C_2). This brings up the interesting point that by using a large capacitor to tune a single coil to two or three bands, harmonic output across the range can be leveled off to some extent. In fact, these tests were paralleled in part using a three-band plate tank, and output at the second harmonic was slightly less in each case than at the third.

Test Circuit Qualifications

In setting up the test circuits, critical items were selected with sufficient care to yield reasonably valid conclusions but not necessarily to produce maximum output in each case. Separate plate coils, for example, were used at each harmonic level, yet even this measure doesn't insure the most favorable L/C ratio in all cases. The cumulative effects of tube and stray circuit capacities begin to play an increasingly important role at the higher frequencies, particularly when capacitive coupling is used between stages. With a more efficient type of interstage coupling, higher order harmonic output would probably increase.

The cathode circuit of the Tri-tet oscillator was fixed-tuned to approximately 1.5 times the crystal frequency for all measurements. This is a generally recommended value and one which turned out to be thoroughly satisfactory for this purpose. A very slight increase in fourth harmonic output was obtained by juggling the value of C_1, but it was too small percentagewise to justify the necessary component changes.

Feedback adjustments with the other circuits proved to be somewhat more frequency sensitive. As the output frequency decreased, substantially higher values of C_4 in the Colpitts and C_6 in the modified Pierce were required to pro-

duce maximum output. Again the difference over this particular operating range was relatively small, so all readings were taken with feedback optimized at the fourth harmonic. Knowing this, two things should be kept in mind: (1) second and third harmonic output readings for these two circuits are slightly lower than they might be; and (2) when working with lower frequency crystals, feedback capacitor values should be considerably larger than those shown here.

Some misgivings arose, at first, over the unusually low screen current drawn by the 5763, but this turned out to be no cause for alarm. A second tube was substituted, and the change in both screen current and output was insignificant. No explanation for this phenomenon can be offered; it is apparently a peculiarity of the tube in this type of service. A set of characteristic curves would probably reveal the answer.

Data Interpretation

Although the data in Table I is largely self-explanatory, some discretion must be exercised in analyzing it or in applying it to the design of other equipment. One highly significant point is that the actual current values listed in the table are much less important than the relationships between those values. The readings themselves would vary considerably with changes in operating conditions, whereas the relative merit of a particular tube or circuit would remain pretty much the same (assuming, of course, that feedback and tank circuit components were properly adjusted).

When using the test data to compare tube performance, all other factors must be held constant. In other words, the amplifier grid current produced by one tube at a given harmonic in a given circuit should be compared with that produced by another tube at the same harmonic in the same circuit. Failure to do this will lead to inconclusive results rather than to a true measure of tube capabilities.

Similar reasoning must be applied in evaluating circuit performance, except that in this case the tube becomes the constant factor. For example, a comparison of second harmonic output from a 12BV7 Tri-tet oscillator with that from a 12BV7 Colpitts would tell us something about the relative merit of the two circuits. If different tubes were used, the comparison would be of rather doubtful value.

Tube Performance

Using Table I in this fashion, and keeping in mind the qualifications discussed previously, several interesting conclusions can be drawn from the test data. The first is that the four tubes, in terms of output, stack up in this order: 12BV7, 6CL6, 6AG7, and 5763. This is not at all surprising. Tube manuals reveal that the 12BV7 has the highest mutual conductance. The 6CL6 and 6AG7 have the same G_m, but the latter is designed for service at lower frequencies (maximum frequency for full ratings, 10 mc). The G_m figure for the 5763 does not appear in handbook charts, but the odds are that it is lower than the others.

This does not mean that the 5763 is unsuitable for harmonic oscillator service. Except in the modified Pierce circuit, where it falls down pretty badly, it is simply not quite as good as the others. There is an interesting sequel to this story, however, which shows this fine little bottle in an entirely different light. The author recently ran a similar series of tests on these and several other popular tubes in doubler service. The 5763 outclassed all of the others, producing more output at lower plate and screen currents.

Knowing the correlation between mutual conductance and harmonic output in these circuits, several potentially excellent oscillator tubes can be spotted in the tube manuals. The 12BY7, mentioned earlier, shows up rather frequently in transmitter schematics. Its performance is virtually identical to that of the 6CL6.

Another tube which looks especially intriguing is the 6BA8A, which combines in one envelope a pentode with a G_m of 9000 and a triode with a mu of 18. This should make an excellent pentode oscillator-tripler, triode doubler combination. At the higher frequencies, output from the pentode section should be only slightly less than that obtainable from a 6AG7 operating at the same voltages.

Circuit Performance

With the exception of the fourth harmonic readings, the data in Table I gives a slight edge to the Tri-tet oscillator over the Colpitts. Possibly all of the honors should go to the former, because, as mentioned earlier, feedback was optimized at the fourth harmonic with the Colpitts while this was known to be the weak spot with the Tri-tet. On the other hand, while output readings were a bit lower with the Colpitts, so too were oscillator plate and screen currents. The Colpitts is probably the least critical to handle in a transmitter which must cover a large number of bands.

The modified Pierce circuit is at best a poor third in all departments. Although it shows some merit at the second harmonic, it begins to look poor at the third and is virtually worthless at the fourth. It is also the most difficult circuit to set up and, except in the case of the 6AG7, requires substantially higher plate and screen currents. In the author's opinion, the inclusion of this circuit in design handbooks is primarily academic. Its value in modern, multi-band transmitting equipment is rather questionable.

Element Currents

Oscillator plate and screen current readings have been included in Table I merely to give

[*Continued on page 118*]

The Ultimate Linear

BY JOSEPH W. SEMKOW*, W8IIP

More than just another kilowatt linear; the "Ultimate" incorporates the most modern circuitry and the new Eimac 3-1000Z, handling 2 kw p.e.p. without even breathing hard. Literally a desk-top unit, hardly larger than the exciter that drives it, the "Ultimate" contains a built in power supply and is fully metered.

THIS new linear is called the "Ultimate," not because a better unit cannot be built, but because most amateurs ultimately have the desire to own a conservative kilowatt and be able to set it on their operating tables. The objectives in building the linear were not necessarily aimed in making it as small as possible, physically, but to see what one could do with standard off-the-shelf components supplied by most distributors. I'm sure one could reduce the size materially, but the project would then be difficult to duplicate for the average amateur.

The "Ultimate" features a full gallon input with all components operating below their maximum ratings, grounded grid operation (n neutralization), 50 ohm pi-network input, n grid bias or screen supplies necessary, table-to design including power supply and uses th new Eimac 3-1000Z hi-mu triode. Any of th current exciters, such as the HT-37, 32S-1 200V, HX-500, Apache or Invader, is easil able to drive the linear to full output. Th schematic is shown in fig. 1.

*200 Green Acres Drive, Dayton 14, Ohio.

[1]Orr, William I., "The 3-400Z and 3-1000Z for Amateur Service," *CQ*, June 1961, page 56.

Front view of the "Ultimate" linear. The complete transmitter, including the power supply, is housed in a 16 × 16 × 20" cabinet.

Amplifier Circuit

A separate pi-network input circuit is em ployed for each band in order to maintain constant 50 ohm load for the exciter.

The pi-networks differ slightly from the da taken from June '61 *CQ*.[1] The difference wa probably influenced by the reactance of th low capacity filament transformer. On 80 mete it was necessary to shunt C_{10} with an additiona capacitor, C_{11}, in order to present a 50 ohm load to the exciter. On 10 meters it was neces sary to increase C_2 to a new value. Refer t fig. 1. All of the pi-circuitry is contained withi a Bud 6 × 4 × 5" Mini-Box.

After the coils and padder capacitors ar mounted in the Bud Mini-Box and wired, preliminary check can be performed on th unit. Connect a 50 ohm non-inductive load a the output of capacitor C_{12} and a 50 ohm v.s.w.r. bridge at the input, J_1. Mount the bridge as close to J_1 as possible. Feed the excite (HT-37, etc.) into the bridge, using minimum signal so as not to burn out the 50 ohm load (I used four 220 ohm 2 watt carbon composi tion resistors in parallel.) Adjust the padder sequentially on all bands for lowest v.s.w.r. was able to reduce the bridge readings to 1.1 to 1. The Q of this pi-network is very low and if aligned at the center of each band, will resul in a low v.s.w.r. when shifting anywhere within the band.

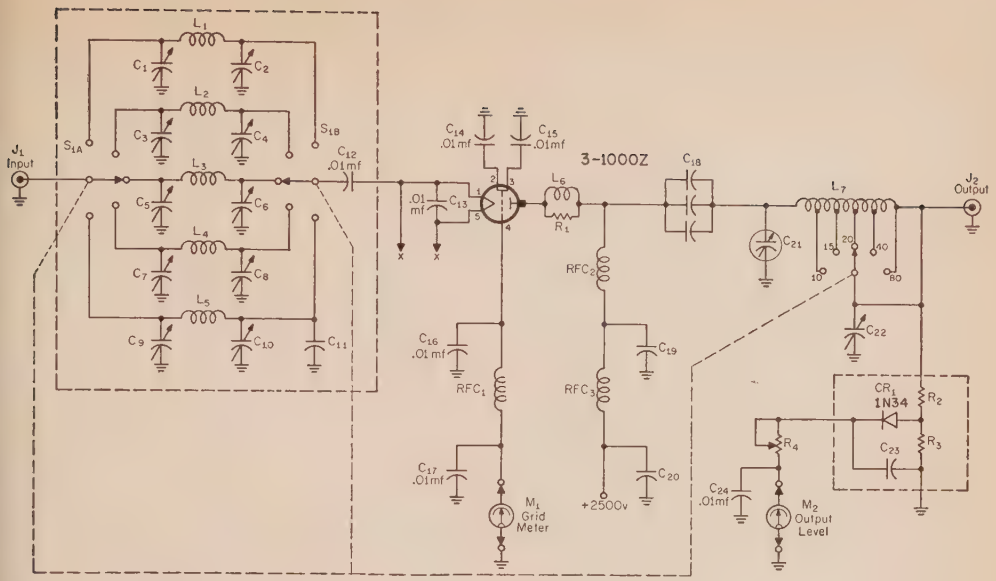


Fig. 1—Circuit of the "Ultimate" linear. It includes a pi-network input for each band, an output level indicator and requires no neutralization for operation from 10 to 80 meters. The tube socket used is the Eimac SK500 with an Eimac type 516 chimney.

C_1, C_2, C_4—15-120 mmf, Arco 302M, or equiv.
C_3, C_5, C_6—65-320 mmf, Arco 303M, or equiv.
C_7, C_8—100-500 mmf, Arco 304M, or equiv.
C_9, C_{10}—340-1070 mmf, Arco 307M, or equiv.
C_{11}—.001 mf 1200 v mica, Aerovox 1446 or equiv.
C_{12}, C_{13}—.01 mf 1200 v mica, Aerovox 1446 or equiv.
C_{14}, C_{15}, C_{16}, C_{17}, C_{23}, C_{24}—.01 mf 1000 v disc ceramic, Centralab DD-103 or equiv.
C_{18}—.001 10kv, three in parallel, TV type, Centralab 850 (858S-1000) or equiv.
C_{19}, C_{20}—.001 10 kv, TV type Centralab 850 (858S-1000) or equiv.
C_{21}—465 mmf vacuum variable. Jennings type USLS.
C_{22}—1500 mmf Cardwell PL-8013 or equiv.
L_1—10 meters, B&W #3002, 6 t, ½" diam.
L_2—15 meters, B&W #3010, 6 t, ¾" diam.
L_3—20 meters, B&W #3010, 7 t, ¾" diam.
L_4—40 meters, B&W #3014, 8 t, 1" diam.
L_5—80 meters, B&W #3014, 15 t, 1" diam.
L_6—3t, ¼" copper shim stock, ⅞" diam. encircling R_1.
L_7—B&W Model 850A. (see text).
M_1—0-250 ma. Simpson #1502 or equiv.
M_2—0-1 ma. Simpson #1502 or equiv.
R_1—Globar, 43 ohms, Workman FR43.
R_2—22k, 3w non-inductive.
R_3—1k, 1w non-inductive.
R_4—20k miniature pot.
RFC_1—1 mh., E. F. Johnson 102-752 or equiv.
RFC_2—B&W 800 plate choke.
RFC_3—Ohmite Z-144 choke.
S_1—2 pole, 2 to 6 pos. 60° index, ceramic. Centralab 2551 or equiv.

Pi-Networks

In my installation, I debated the location of the input pi-network. There was room directly behind the B&W tank coil and it could be ganged easily in this way. On the other hand this pi-network assembly represents the input to a very high-mu triode (amp. factor 200) and for the sake of good isolation and freedom from oscillation, I decided to obtain a National RAD right-angle drive and mount the input pi-network below deck.

It is suggested that the builder make minor adjustments to the pi-network again after he has coupled it to the input of the tube as stray reactance may detune it. If one should attempt to replace the 3-1000Z triode by plugging a 4-1000A into the socket, slight readjustments will be necessary to the pi-network padders because the 4-1000A presents a substantially different input impedance (over 100 ohms.)

In the output circuit, the B&W Model 850A coil was slightly modified to improve the L to C ratio. One turn was removed on the 80 meter section and the 40 meter tap was unsoldered and moved one turn for less inductance. At the time the construction was started I was not aware that B&W manufactures another coil and switch Model 852. I believe this component would be more desirable and is interchangeable physically.

The vacuum capacitor utilized could be a smaller version (250 mmf) when the 850A unit is used, but 465 mmf is required for the 852 turret.

Problems

Several interesting things showed up in my tests of the linear. This one occurred only when the linear was on 10 or 15 meters running a kw. An 8" piece of RG-8/U cable was originally used to connect the stator of the Cardwell

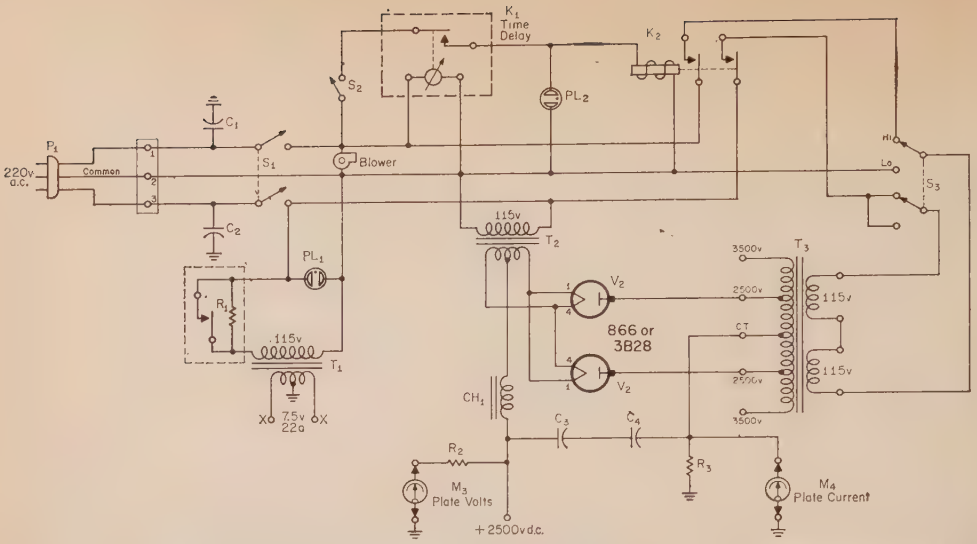
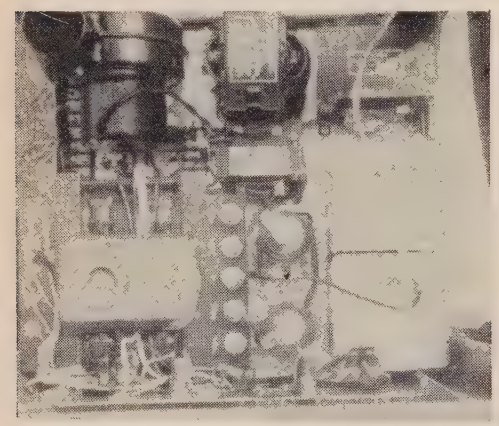


Fig. 2—Circuit diagram of the power supply for the linear. The features include a time delay relay for the high voltage and a Surgistor for control of the 3-1000Z filament current.

BL_1—Blower, shaded pole, 60 c.f.m., Dayton 1C939.
C_1, C_2—.01 mf 1000 v. disc ceramic, Centralab DD-103.
C_3, C_4—20 mf 660 v.a.c., surplus, or electrolytic bank as shown in fig. 3. (See Text.)
CH_1—8 h, 400 ma, Osborne Transformer Co. Detroit, Mich. #13459.
K_1—Motor-driven adjustable time delay relay, 30 to 60 seconds, normally open. Surplus.
K_2—D.p.s.t., 117 v.a.c. relay with ¼" contacts, normally open. Surplus.
M_3—0-4000 v.d.c., Simpson #1502.
M_4—0-750 ma, Simpson #1502
R_1—Surgistor, 100 to 300 watts, G.C. Electronics, Model 5301.
R_2—8 megohm meter multiplier, Simpson #183.
R_3—75 ohms, 10 watts.
S_1—D.p.s.t. Heavy duty.
S_2—S.p.s.t. Heavy duty.
S_3—D.p.d.t. Heavy duty.
T_1—7.5 v at 22a, low capacitance, Osborne Transformer Co., #7900.
T_2—2.5 v at 10a, Osborne #97W.
T_3—Plate transformer, Osborne #8924.
P_1—3 wire a.c. plug, Hubble #7572.
PL_1, PL_2—Panel lights, neon type. E. F. Johnson #147-1143.

output pi capacitor, C_{22}, to the output connection of the B&W coil and switch. Also, at this junction there is another short 6" length of RG-8/U coax cable to the coaxial output jack, J_2. I experienced cable failure of the 8" piece connected to the output capacitor. Evidently the dielectric loss of the insulation was high with the large circulating r.f. current. I could not keep the polyethelene from melting and shorting. The coax was eventually replaced with a ½" wide copper strip and the problem was solved.



Top view of the power supply showing component layout. The 866's are carefully sandwiched between the filters and power transformer. The time delay relay is mounted atop the power transformer.

Figure 1 shows R_2, R_3, C_{23} and CR_1 within a dotted area. This is another small Bud minibox, Model CU-3000, mounted near the B&W output coil. It samples a portion of the output voltage, rectifies it, and operates an output meter, M_2, 0-1 ma. which is very useful for indicating maximum output. Resistor R_4 controls the range and sensitivity of M_2.

Another point of interest is the combination L_6-R_1, the v.h.f. parasitic suppressor in the plate circuit of the 3-1000Z. This should be mounted adjacent to the plate cap. The first suppressor used was made up of four 220 ohm, 2 watt composition carbon resistors. A 3 turn coil of #12 wire 1" in diameter was wound around the outside of the four paralleled resistors. Everything worked fine until 10 meter tests were conducted. After 3 or 4 minutes of operation on 10 meters the resistors exploded. The resistors were replaced with a "Globar" unit made by Workman, Inc. They are used in TV sets and are obtainable at most jobbers. The model number is FR-43 and measures 43 ohms at 600 ma, hot. When the original 3 turn coil was replaced by a 3 turn coil made of ¼" copper strip, the troubles disappeared.

The parasitic trap dissipates a small amount of fundamental power on 10 meters (ten or twelve watts), so the resistor must be capable of withstanding this power.

Power Supply Circuit

The power supply is a conventional full wave circuit using 866A's or 3B28's in conjunction with a special plate transformer. This transformer, T_3, is the key to the compact construction of the "Ultimate" and it measures only about 8" on each side. It has a split primary for either 115 or 230 volt use, and a secondary of 3500 each side of c.t. and is tapped at 2500 v. This Hyper-sil-construction transformer will deliver 1½ kw continuously and is a standard item manufactured by Osborne Transformer Company, 3834 Mitchell Ave. Detroit 7, Mich. They can supply it off-the-shelf or on short notice.

The use of a low capacity filament transformer, T_1, eliminates the need for filament chokes for the 3-1000Z. This transformer, as well as filter choke, CH_1 and 866A filament transformer, T_2, is also available from Osborne.

Tubes such as the 3-1000Z, 4-1000A, and Amperex QB5/2000 require transformers with a high filament current capability (21 to 22 amperes at 7.5 volts). When the tubes are cold, the filament resistance is extremely low and starting current is quite high. "Slo-blo" fuses are often used to protect circuits of this type. The TV industry is faced with a similar problem. TV sets contain large numbers of tubes and an expensive picture tube. The "Surgistor" was developed to help reduce tube failure caused by cold starts. It is basically a small resistor/heating element in parallel with a bi-metal contact.

In this case, when the voltage is first applied to the primary of the filament transformer, T_1. R_1 reduces the filament voltage to a safe level, less than ½ rated value. After 10 or 15 seconds R_1 heats up and the bi-metal contacts short out the resistor, providing normal filament voltage.

One other luxury on the power deck is the time delay relay, K_1, used to prevent accidental application of high voltage. Relay K_1 can be adjusted for any delay up to 1 minute. The one used is a surplus unit, but there is a variety of similar commercial units available that are not too costly.

The rest of the power deck is quite conventional in that the time delay relay, K_1, operates the high voltage relay, K_2, providing the high voltage control switch S_2 is closed. All

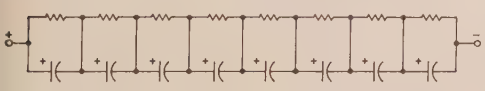
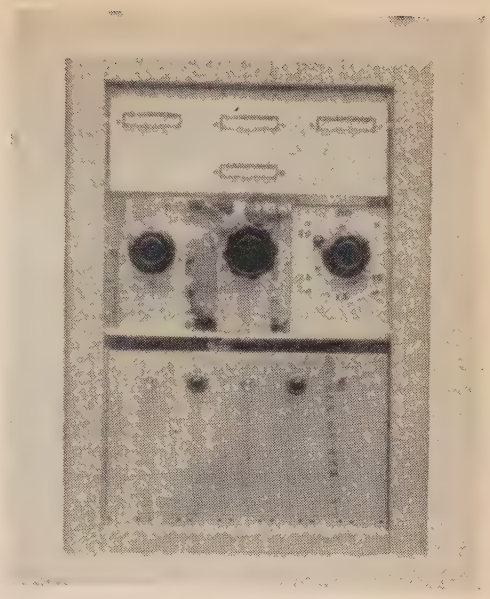


Fig. 3—Circuit of filter that may be used to replace the two surplus units shown in fig. 2. The capacitors should be 125 mf each at 450 v.d.c. and the shunting resistors are 50k, 10 watts each.



Front view of the linear showing the sub-panels. These panels are then covered with an aluminum panel followed by a formica dress panel.

switches are of the toggle type and are heavy duty units.

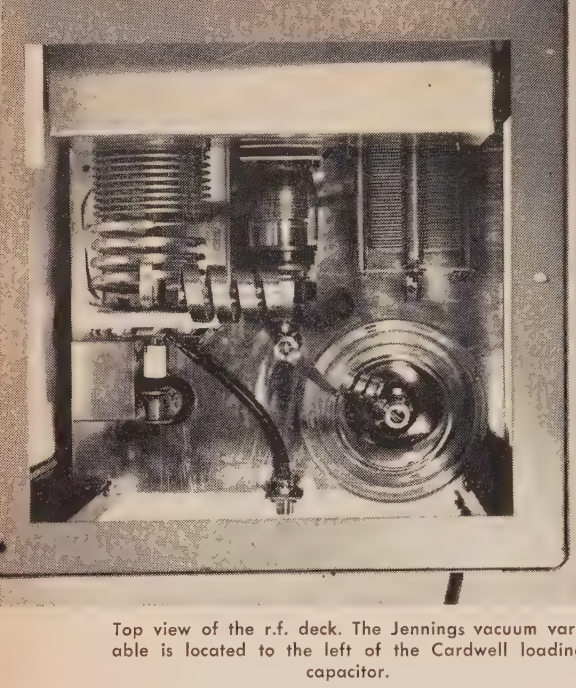
A last word on the power deck; the filter capacitors used were two 20 mf 660 v.a.c. capacitors in series. These surplus capacitors are rated 660 v. r.m.s. which means they can actually handle about 1900 v.d.c. each or 3800 v.d.c. when in series. If similar capacitors are not easily obtainable, then a bank of electrolytics, as shown in fig. 3, will do as well, and take about the same space.

Construction

A Bud Model PC-1704 cabinet was selected to house the linear. The cabinet was set up in a vertical position and the ball cornered sides removed. The finished size of the "Ultimate" is approximately 16 × 16 × 20" and includes within these confines the complete power supply and r.f. deck.

The reader need not be committed to the exact layout used by the writer. In fact you may want to utilize the cabinet in a horizontal position rather than the vertical. I had limited desk space available and therefore chose the vertical position.

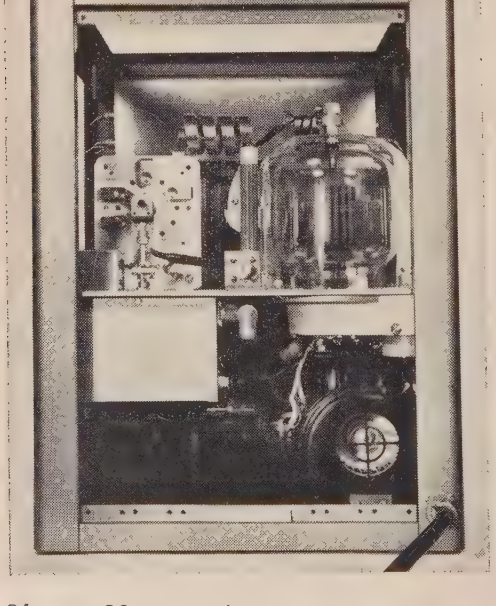
Rather than use a conventional chassis to mount the components, two identical 15 × 15 × ¼" aluminum plates were obtained. One was mounted at the bottom of the cabinet frame, the other 9" above it. Power supply components were then juggled around the bottom plate until a suitable layout presented itself. Before firming up the power supply component layout, be sure you locate the position of the tube socket on the upper r.f. deck as it is to be sub-mounted and extends into the lower deck area.



Top view of the r.f. deck. The Jennings vacuum variable is located to the left of the Cardwell loading capacitor.

In the layout shown you can see that the blower motor's relationship to the tube socket on the upper deck was of prime importance. The throat of the blower must be in direct line with the tube socket air hole (2" dia.). Once these parameters are resolved the rest of the power supply components can be arranged to suit the builder. This represents the most time consuming part of the assembly.

The lower aluminum plate is drilled and tapped to provide suitable mounting for the various components. The r.f. deck layout is quite simple as it utilizes but a few components and very little wiring and is apparent from the photographs.



Rear view of the linear. The B&W band switch on the left of the r.f. deck is coupled to the input pi-network band switch through a right angle drive. Input to the linear is through the connector mounted on the input mini-box. The small mini-box to the left of the right angle drive contains the output level meter components.

A sub-panel of aluminum is made up and mounted in the lower part of the front cabinet frame so as to support the final dress panel. This sub-panel primarily supports the toggle switches and indicator lights.

Near the top of the cabinet frame another sub-panel is made of thin Reynolds Aluminum to mount the four Simpson meters. This sub-panel in turn is completely enclosed in the rear by an aluminum case and provides r.f. shielding for the meters. See fig. 4. The final r.f. shielding of the front of the cabinet is accomplished by a thin Reynolds aluminum sheet 12¼" × 19" with cut-outs for the switches meters and dials. The black 3/16" Formica panel is a replica of the 12¼" × 19" shield panel and is mounted against it to dress the appearance.

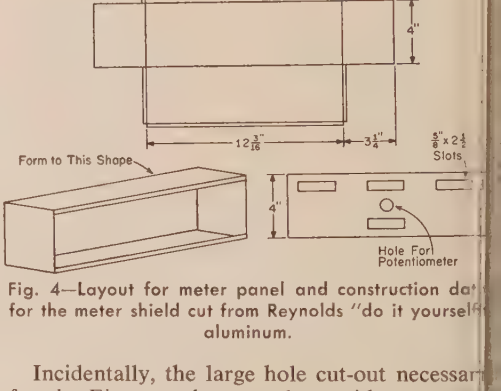


Fig. 4—Layout for meter panel and construction data for the meter shield cut from Reynolds "do it yourself" aluminum.

Incidentally, the large hole cut-out necessary for the Eimac socket was done with a conventional carpenter's brace and Greenlee circle cutter. The ¼" aluminum plate is easy to drill and tap. The average amateur should not have difficulty in duplicating the linear.

Performance

In the s.s.b. mode of operation, driven by the HT-37, the linear operates with approximately 2500 volts and consumes 160 ma during stand-by. No heavy bleeder is necessary on the power supply as the tube itself provides this function. This results in less heat in the power supply compartment and stiff regulation. The "Ultimate" is easily talked up to 400 ma, average d.c. input.

On c.w., with the HT-37 carrier injection turned up until the linear grid current reached 250 ma, the "Ultimate" was loaded to 700 ma

(1¾ kw)! A dummy load was used since this much power to the antenna is illegal. The linear was still well within its 1000 watt rated dissipation.

In the a.m. mode, (d.s.b. position of the HT-37), 50% carrier injection was provided to the linear so that the plate current measured slightly over 300 ma resulting in a 750 watt a.m. phone signal! That's a lot of punch considering the fact that no high level audio was necessary for 100% modulation. A.m.'ers presently utilizing DX-100's, Vikings, Apaches, etc., are sure to welcome this increased power and capability.

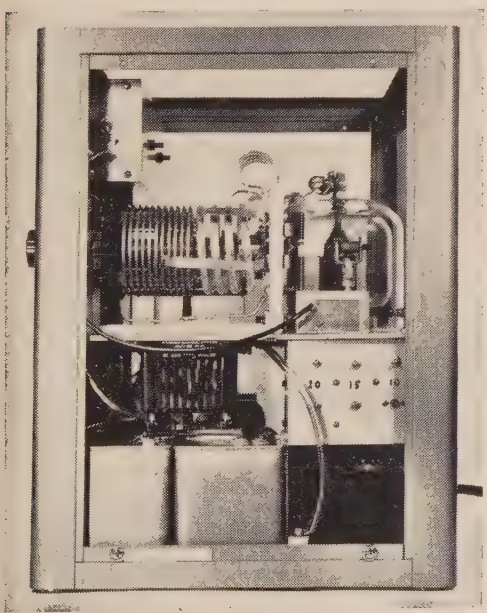
Costs and Credits

What does it cost? This is important, because you get only what you pay for. A very popular kit recently introduced and capable of about ½ kw average d.c. power on s.s.b. sells for $225. If you were to go to the jobber/distributor and duplicate my components they would total somewhere between $600 and $700. But realize, this rig can do a kw average d.c. with ease. The nearest commercial equivalent would cost you over $1,500. Think it over . . .

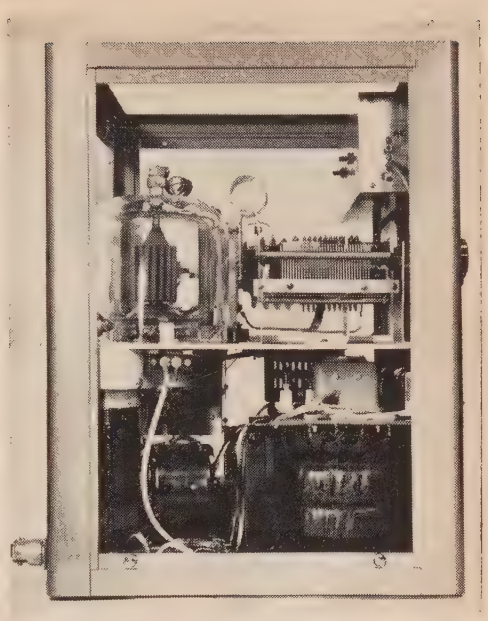
My sincerest thanks to the wonderful group of companies that participated in this venture. Most of these people are regular advertisers who spend considerable money trying to tell us about their fine products, and I firmly believe they are the best obtainable anywhere. They are:

B&W (Tom Consalvi, W3EOZ), Eimac (Dick Orth, Jack Quinn, Bob Siff and others), Simpson Electric Co. (Messrs. Buehring and Vandervoort), Jennings Radio Mfg. Co. (Jo Jennings, W6EI), Osborne Transformer Co. (Bob and Earl Osborne, both hams, Triplett Electric Instruments (Norman Edinger sent wonderful meters, but too large for my use), Bud Radio, Inc. (Mr. A. Haas, President), Amperex Electronic Corp. (Mr. Griss Ashby, John Nielsen).

My thanks also to my wife Ann, who gave up our two week vacation so that the "Ultimate" could be built. ■



Side view of the linear. The pi-input circuits are contained in the Mini-Box under the r.f. shelf, on the right. To the left of it is the plate meter multiplier with the two filter capacitors just below the multiplier. The meter shield case may be seen just above the output tank.



Left side view of the linear showing the location of the blower, high voltage transformer and time delay relay below the r.f. deck.

". . . so I said to myself to heck with miniaturization . . ."

A Day In The Life Of A Ham

BY DORIS K. SUTCLIFFE*

The following play was first produced and presented in January, 1948, by the North Carolina Floating Club of Winston-Salem, sponsored by The Key and Mike Radio Club. The play is a topical comedy, or spoof on us as we see ourselves. The characters are familiar to many of us as neighbors, family and enthusiastic aspirants to our noble hobby. The play runs about 15 minutes and can be presented at local ham fests and get-togethers. Using your imagination to include local topics and personal experiences should result in a pleasant evening's entertainment.

Characters

The OM.....*amateur radio operator, dubbed the old man*
Junior .....*his son*
Mrs. Fixit .....*owner of obsolete radio set*
Embryonic Ham.....*an aspiring high school boy*
George Tenor .....*aiming to become a master of ceremonies*
Emma Tenor .....*his dowdy wife*
Brother Ham .....*always willing to help out in a crisis*
Broadcast Buddy .....*eager to play any wind instrument on the air*
The BCL .....*broadcaster listener*
Spanish OM .....*a voice in Spanish from off-stage*

A Day in the Life of A Ham

Time: *Sunday, at mealtime.*
Setting: *Radio room in a private home.*
At Rise: *The stage has been converted into a ham shack and features a radio transmitter of nondescript tubes, cabinets, and a maze of wires. The walls are decorated with QSL cards. The OM, seated in a swivel chair, turns knobs of the rig on the table and speaks into the microphone which he holds. He wears a headset and his hair is rumpled. His voice is jovial, not talked out, as he begins to sign off reluctantly.*

OM *(rocking back and forth in his swivel chair):* This has been a mighty fine QSO and I'm sure glad to have hooked up with you down there. Glad to hear your weather stays good and you weren't in the path of that hurricane. Okay on your new antenna system and your contact with Iceland. Sure getting around—that's what I call DX. Ham radio is a real thrill (Junior *enters*)

Junior: Daddy. *(no answer)* Daddy! (OM *motions to keep still*) Mom says dinner'll be ready in ten minutes. *(An afterthought)* Fish. *(Junior faces audience, wrinkles his nose and again says):* Fish. *(Junior slowly raises the visor of his trick cap, by means of a concealed string. Turns to go)*

OM *(Notices Junior for the first time):* Junior, come here! *(Into microphone):* Hold on, here's the Junior op. I'm going to put him on to say hello to you. Just a minute. *(Motions to Junior to hurry):* Come here, Junior, and say something. . . .

Junior: No.

OM: *(With frantic gestures):* Come on, he wants to hear you.

Junior *(Shaking his head):* Don't know him. Never heard of him. Nothin' to say.

OM: Well, say hello.

Junior *(Quickly into the mike):* Hello. *(Jumps back as if scared. Trips over wire and breaks it. Junior lifts his dungarees and examines legs for scratches. He moans and rubs himself.)*

OM *(Jumps up, excited. Exasperated):* Hey! Look out! Oooh—ooh—oh! Now see what you've done! My power supply lead is shot. I'm off the air. *(Picks up wire and dangles it.)* Well, I suppose I'll just have to fix it. I wonder where I put that roll of solder? *(OM begins to tinker.)*

Junior *(Re-arranges the trick cap, brushes off his dungarees and glancing sideways at the OM, listens to sound of pans rattling in the kitchen off-stage):* Fish! *(Exit Junior)*

OM *(Talks to himself while he moves equip-*

*3600 Old Vineyard Road, Winston-Salem, North Carolina

ment on the table, lifts cover of cabinet, takes out tube, squints at it, puts it back and closes cover.): Maybe it is a bunch of haywire but it works. *(Picks up logbook and thumbs through it)* Here I've talked with Alaska and Brazil and Italy and Atlantic City. . . . *(Enter Mrs. Fixit)*

Mrs. Fixit *(Wears outlandish hat and carries a radio under her left arm, an old-style antenna similar to a clothes-line umbrella in her right hand. She is smiling):* I understand you fix radios so I've brought mine over for you to fix. *(She drapes the antenna over the OM's desk and sets radio under his nose. OM wearing earphones looks on quite mystified.)* Now this is a real good radio; been in our family for years—We heard election returns on it back in nineteen twenty eight—Lately it won't work. I get a kind of sputtering noise on it, not exactly though—more of a whine that builds up to a wheeeeeewhooooo and then a steady zizzzzzzz—Now you know how it sounds, you can fix it, I'm sure!

OM *(Scratches his head):* Well you see I don't do repair work, not radio repair work. I—er—that is—

Mrs. Fixit *(Slaps him on the back, merrily):* Now, now — Don't be so modest. You're clever at radio. With those earphones on your head you look right smart. You'll find what ails it.

OM *(Steps center Front and bows to audience, turns and bows to Mrs. Fixit):* Thank you! Thank you!

Mrs. Fixit *(Lifts up the old-style antenna and hands it to OM):* Now you take this aerial here, it's kind of loosened up—it's still slack here, where I tried to tighten it with a crochet hook. But with some of your new wire on it and maybe a little dab of solder here and there, it'll be good as new. I'll leave it right here. I know you can fix it. *(She smiles, pats OM on the arm and makes exit through kitchen. Sounds of pans rattling from kitchen off-stage.)*

OM *(Shakes his head and looks at the junk on the table. The phone rings. OM answers it.)*

Voice: Hello. I'm George Tenor over here on High Street. I'd like to see your radio station if you're going to be home today.

OM: Sure, I'll be here. Come over. It isn't much to look at but it works . . . most of the time—Ha! Ha!

Voice: I'll be seein' ya then. Okay. Goodbye.

Junior *(Enters as OM hangs up phone):* Mom says dinner'll be ready in five minutes. *(Exits quickly into kitchen. Again pans rattle and clang.)*

Embryonic Ham *(Enters from kitchen):* I hope I'm not intruding. I've been listening to you on my crystal set and I'd like to learn to be a ham, too. Could you help me?

OM *(Smiling with satisfaction):* Why, I'd be glad to. You know the code?

E. Ham: Oh, no. I don't know anything about radio. I thought there was some way you might help me so I could get on the air right away. Some short cut. Something streamlined.

OM *(Gestures toward the rig):* Does this look stream-line?—No, my boy, you'll have to get down to fundamentals first. Here, you read these books *(hands him* CQ *magazines, Radio Handbook, etc.)* and show up at code practice every Thursday night—and I'll give you some parts for your first rig.

E. Ham: Oh, do I have to learn code and study all these books?

OM: Yes, you have to, to get a license.

E. Ham: But do I need to get a license?

OM: Sure. You can't go on the air without a license.

E. Ham: Oh, I thought radio was fun. If it takes all that, I'll stick to my crystal set. Here's your books! *(Drops books on floor.)*

E. Ham *(Exit through kitchen while sound of pans becomes lounder as George Tenor enters):* Goodbye!

George Tenor *(His hand outstretched in a gay greeting):* Hi! I'm George, who just phoned and asked myself over. Have a cigarette? *(Hands package of cigarettes to OM)* Nice to be neighbors. Thought I'd drop in to see your broadcasting station. I'd like to sing a song so my brother in Richmond can hear me. *(Sings a few bars of "O Sole Mio.")* I've got a friend who plays the French horn.

OM *(Removing earphones):* This isn't a broadcast station, Mr. Tenor.

George Tenor *(Rubbing his hands together happily):* Sure it is. My wife listens to you every night. Fibber Magee and Molly are on. She can hear you real plain but she can't get Fibber and Molly.

OM *(Sinks low in his swivel chair):* Oh!

George Tenor *(calls toward the kitchen):* Say, Emma! Come here a minute.

Emma's Voice: Coming George. *(Enter Emma. She wears hat with tall red roses which bounce as she nods her head. She carries a newspaper containing lists of her favorite radio programs):* Well here we are!

George Tenor: I've been telling him his voice comes in louder than Fibber's on our radio.

Emma: It sure does. *(Flattering smile)* And I love to hear you. Except on Tuesdays, Thursdays and Saturdays when I listen to *these* programs. *(Emma opens newspaper to show the OM. They all lean over the table to read where she is pointing.)* See, I've marked them all with a red pencil, and I'll just leave this paper here for you so you'll remember not to broadcast *(Points a playful finger)* on Tuesday, Thursday and Saturday.

OM *(In a daze looks out over the audience):* Tuesday—Thursday—Saturday . . .

Emma: We must go now, George. Dinner is ready—the ham was half baked when we left.

George Tenor: Nothing better than ham, any way you cook it. *(Follows Emma through kitchen.)* I'll be back.

OM *(To himself):* Tuesday, Thursday, Saturday. Well, this is Sunday. She didn't say I interfered with any Sunday program. *(Tunes in and gets howls and squeals and static.)*

Brother Ham *(standing in doorway):* Hi, Bill. How things goin'?

OM: Terrible. Everything's gone wrong . . . just *everything!*

Brother Ham: Gosh that's tough. And look here, I got some mail of yours that came to my house. I guess the Post Office got our calls mixed. I opened the letter by mistake before I noticed so I might just as well read it to you. *(Takes pink slip of paper from envelope and reads with loud gusto)* This is from Grand Island. You are 9 kc out of the band. All the airlines from here to Salt Lake City lost contact with their ground stations because of your splatter. If you do not reply within ten days, you must go off the air.
(Sound of cow bell.)

Junior *(Ringing cow bell):* Mom says dinner's ready. Last call to dinner. Last call. Last call! *(Out to kitchen ringing cow bell where sound of pans continues.)*

George Tenor and **Broadcast Buddy** enter together. *(The latter carries a wind instrument; horn, cornet, fife, or sax.)*

George Tenor: Here we are, all ready to broadcast.

OM: But you can't. This is *not* a broadcast station. I told you so.

George Tenor: Listen. We're going on the air. You can't let me down now. I wrote my brother in Richmond last week to listen for me today and I'll bet he's tuning in right now to get me.—Let 'er blow, Buddy.

Broadcast Buddy *(Strikes a pose center stage and after hitting some sour notes, comes up with a tune resembling "O Sole Mio," but not any actual melody. George Tenor sings, loud, with gestures.)*

Brother Ham *(Goes off-stage, returns with a glass of water, hands it to OM who gulps water while music plays):* Here. Drink this, Bill, and you won't look so green around the gills. Gosh! you look awful. Maybe I ought to open a window and get some air.

OM: I don't want any more air.

BCL: *(Stands in the doorway)* Hold it, right where you are!*(Strides forward and pounds his fist on the table.)* I'm warning you for the last time, this has got to stop. I won't stand for it. Fifteen minutes ago I heard you again on my radio. I paid $18.98 for that radio, and it's a good one. It works on AC or DC. And it gets all the stations this side of the Blue Ridge Mountains. You come in stronger than any of them. You're so loud, you drown 'em out. I want it stopped. If I hear you again, I'm going to call the sheriff and have you put off the air!
(Loud sound effects. Phone rings. Cow bell rings. Horn makes blasts. Pans in the kitchen make a clatter.)

Voice: Here's your dinner! *(Large fish is thrown onto the stage.)*

OM: *Stop (Holds up both hands)* Everything Stop! *(Silence)*

OM: Listen to that. It's in Spanish. *(Voice comes over radio.)*

Voice: Say Coo, Say Coo. Dey Ecces. Yamana Heneral. Costa Rica. Cambio, Cambio.

OM *(Determined and excited):* I am going to work that Costa Rican Station if it is the last thing I ever do. *(He turns a knob. The lights go up. He keeps turning knobs. The lights begin to go down. Everybody stands there, not moving. The transmitter begins to fall apart, piece by piece. But the voice in Spanish continues to come over the loud speaker. Then there is a loud bang and a cloud rises from the transmitter as the phone starts ringing and Junior runs across stage ringing his cow bell, straight into his daddy's arms.)*

Production Notes

Characters: 10 male; or 8 male; 2 female. All male is more humorous.

Playing time: 15 minutes.

Costumes: Informal for men. Women wear outlandish or old-style hats and the dresses are freakish. Junior is barefoot, wears dungarees and a cap; he may be a large boy or young man dressed to look like a small boy. All characters should wear something distinctive. George Tenor wears a flower in his buttonhole. The Embryonic Ham wears glasses with dark frames. The angry BCL wears a bright red necktie. Broadcast Buddy wears a turtle neck sweater and keeps his hat on.

Properties: Telephone. At least two radios. A loud speaker. A microphone. Odds and ends of electrical wire and tubes. A large sign titled DANGER - HIGH VOLTAGE. Some QSL cards for the walls. A globe of the world to dress up one table. A swivel chair. Two straight chairs. Two tables or one flat top desk and one table. Pans and a sheet of tin for sound effects. A cow bell. A newspaper. A pink slip of paper in an envelope. A wind instrument, such as horn or cornet. A set of earphones for the OM. A makeshift loop antenna for Mrs. Fixit. A trick novelty known as a Whiz Bang to sound off when the OM's transmitter goes up in a cloud of smoke. A few books. A desk lamp. A cloth or plastic fish.

Setting: The stage is a ham shack, the den of a radio amateur. It looks like a happy state of confusion, with wires strung around and the two tables cluttered with books, boxes or cabinets, desk lamp, radio gear and hardly room for the telephone.

Lighting: No special effects until the last, when lights come up and then grow dim. A yellow spot may be used, followed by a blue spot. However, with the Whiz Bang sounding off at the finish, no other lighting effect is really necessary. ■

THE MIGHTY MOUSE

BY H. E. SPAULDING*, W6BAF

This 50 watt filter type s.s.b. exciter provides high stability output on 20 meters through use of a variable frequency crystal oscillator (v.x.o.). Neat and compact construction lend the unit the portability necessary for field day and away from home operation.

WHILE abroad last fall, the need for a small, compact rig was felt. It was from this need that this little transmitter evolved.

What were the requirements to be? First, it should be as compact as possible. After that, it should be simple, easy to maintain and as efficient as possible and be in the 50 watt class. So with these thoughts in mind and some tried and proven circuits, I went to work on the drawing board.

A California Chassis cabinet and chassis were sitting on the shelf in the shack and it seemed to fill the bill. It measured 4½" high by 9¼" wide by 7¼" deep and carried the stock number of LTC 464. Now let's see what will go in a cabinet of that size.

In researching some articles, I ran across Joe Galeski's article on the "Imp"[1] and it seemed that some of his ideas might be of use. Thus evolved some of the circuitry, shown in fig. 1, along with some of my own ideas. Now for the game of checkers with parts.

The Filter

The filter used is a Bliley BFN-5000B6 which has a bandwidth of about 3.5 kc at the –6 db point and a shape factor of 3.5. This is a special filter which costs approximately $70.00. It can be ordered from your local distributor or directly from Bliley. A home made filter could be used with equal results. A number of articles have appeared in *CQ* and *QST* on the construction of such filters.

*3925 Osler St., Long Beach 8, Calif.

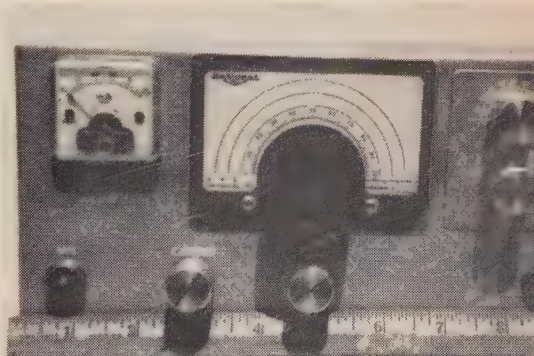
[1] Galeski, J. S., "The 'Imp'—a 3-Tube Filter Rig," *QST*, May, 1960, page 11.

The Variable Frequency Oscillator

In looking for a stable v.f.o., the v.x.o. circuit was breadboarded and tried with good results, but the frequency coverage was rather limited plus the fact that the coil involved was rather bulky. In trying to reduce the size of the coil, a toroid form was tried with some very favorable results. It was found that with the toroid form, the crystal could be "pulled" about 400 kc in the configuration shown in the circuit. However, the crystal would not "start" again once the power was turned off when "pulled" to such extremes. Not needing that much coverage, experiments were made limiting the coverage to 150 kc. This was thoroughly checked and it was found that by maintaining approximately 250 volts on the plate of the oscillator, it proved to be quite stable and the crystal would "re-start" reliably. The v.x.o. was then checked on a Hewlett Packard 524B electronic counter and was found to be stable to within 10 cycles over a period of three hours. This solved the v.f.o. problem.

The Toroid Coil

The toroid form was wound with approximately 60 turns of number #30 wire (formvar) and then painted with several coats of household cement. Before cementing the turns, the frequency coverage was checked again and a few turns were taken off to attain the desired range. It was found that frequency change was quite rapid so it is advisable to remove or add one or two turns at a time so that you don't overshoot your mark. You will probably notice a "bunching" effect on the low end of the v.x.o. This seems to be a normal function



Front view of the 50 watt filter type s.s.b. exciter. Along the bottom edge are: Microphone, Carrier Insertion, Audio Gain, and Key Jack. The controls at the upper right are: Plate Tuning, with the Plate Loading capacitor above it. The meter reads the 6146 cathode current.

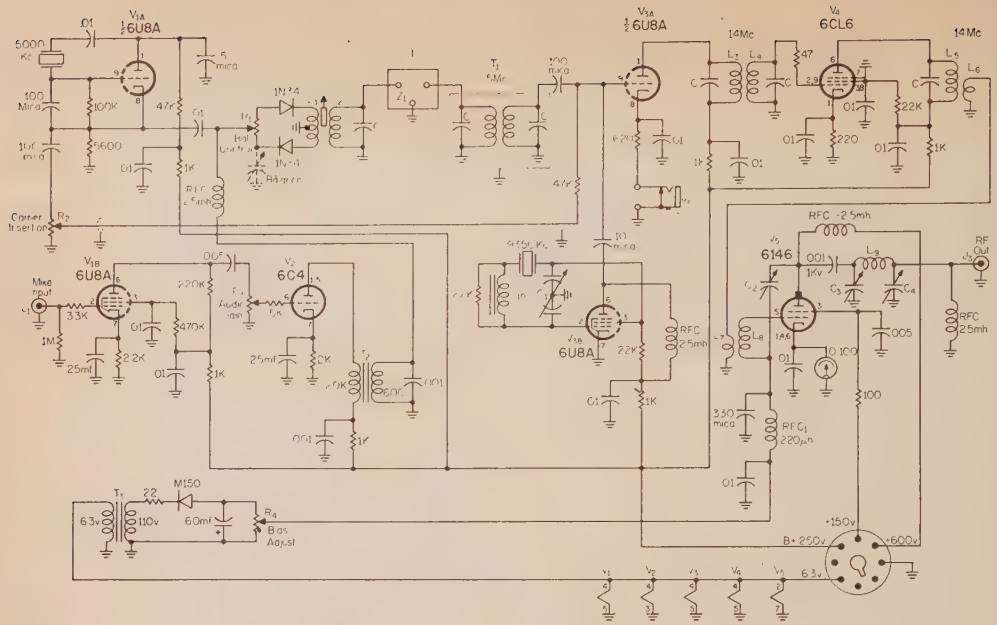


Fig. 1—Schematic diagram of The Mighty Mouse, a 50 watt filter type s.s.b. exciter using a Bliley Electric 5 mc crystal filter, Z_1. If difficulty is encountered in obtaining the Bliley filter, one of the McCoy 9 mc filters may be substituted with corresponding changes in crystal frequencies and tuned circuits.

C_1—50 mmf, split stator variable. Hammarlund HFD-50.
C_2—3-12 mmf trimmer. Centralab type 822-FZ.
C_3—100 mmf variable. Hammarlund HF-100.
C_4—360 mmf variable. Broadcast radio type.
J_1—Microphone connector. Amphenol # 75PC1M.
J_2—Closed circuit phone jack.
J_3—Chassis mounting BNC connector.
L_1—8 t. #28 e. bifilar wound on L_2.
L_2—60 t. #28 e. scramble wound on XR-91 form.
L_3, L_4—20 t. #28 e. closewound on XR-91 form. L_3 and L_4 mounted on ¾" centers.
L_5, L_8—20 t. #22 e. close wound on XR-91 form.
L_6, L_7—2 t. #22 e. link on L_5 and L_8.
L_9—15 t. #18 e. 1" dia. 8 t.p.i. B&W 3014.
L_{10}—60 t. #30 e. on Micrometal T50-7 toroid form. Micrometals Inc., 72 East Montecito Ave., Sierra Madre, California.
R_1—500 ohm ½watt pot.
R_2—1K 2 watt pot.
R_3—500K 2 watt pot.
R_4—5K ohm 2 watt pot.
RFC_1—220 μh.
T_1—Modified 4.5 mc i.f. can. See text. Miller 1466.
T_2—600 ohm to 19,000 ohm. FTR TF1A19 (W2EWL special) or equiv.
T_3—117 v to 6.3 at 0.6 a. Stancor P-6465.
Z_1—Bliley 5 mc BFN-5000B6, Crystal Filter. Available from Bliley Electric Co. Crystal Division, 200 Union Station Bldg., Erie, Pa.

and is not objectionable.

Mounting of the toroid is accomplished by using two rubber grommets, one on either side of the toroid, and bolting it to the chassis with a 6-32 screw. The field of the coil is contained within the toroid so this type of mounting does not affect the frequency.

The Crystals

The crystal used in the v.x.o. circuit is of the "garden variety" obtained from Jet Crystals in Torrance, Calif. The fundamental frequency is 9350 kc. This gives coverage from 14,350 kc to 14,200 kc when "pulled" 150 kc.

The carrier oscillator is straightforward and a 4,998 kc crystal seems to place the carrier on about the right point of the filter curve. A small trimmer capacitor may be placed across the crystal so that it could be "pulled" down a little if necessary.

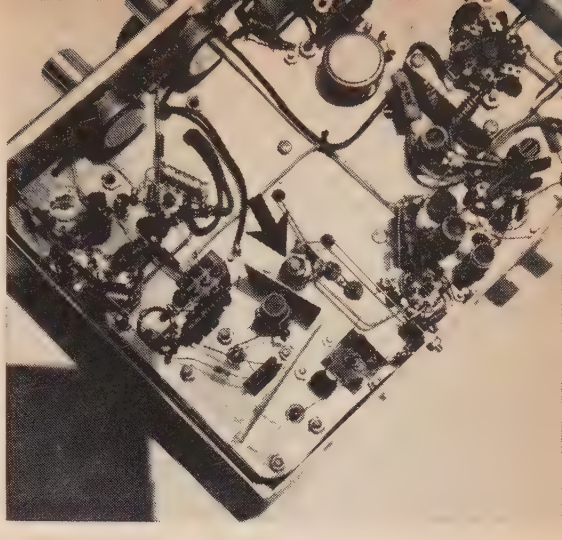
The Balanced Modulator

A 1N35 (matched pair of 1N34's) was used in the balanced modulator. A balance capacitor was not found necessary in this rig but may be tried to see if the carrier suppression can be improved.

A word about the 5 mc i.f. transformer would be in order here. A Miller 4.5 mc i.f. was used with the padding capacitors cut out. These capacitors were replaced with smaller ones to resonate the i.f. at 5 mc. It was found later that not enough coupling was obtained with the two windings spaced as they were, so the top winding was loosened with lacquer thinner and was pushed toward the lower winding until they were about ⅝ of an inch apart.

Amplifier Stages

The plate coil of the 6U8 and the grid coil



Bottom view of the s.s.b. exciter gives an uncluttered appearance. The trimmer in the upper left corner, across the 5 kc crystal, is not shown in the diagram and enables the crystal to be pulled to the correct point on the filter curve. The shield in the lower left corner isolates the filter input and output and also separates L_1 from L_{10}, the toroid, identified by the arrow. The bias supply and the bias adjust pot are located in the upper right corner.

of the 6CL6 are spaced three quarters of an inch apart center to center. Caution should be taken in tuning these coils as it is quite easy to tune them to 10 mc (second harmonic of the oscillator) rather than 14 mc. It is advisable to use a grid dip oscillator to pre-set these coils. When dipping, short out the coil not being checked so that you are sure of dipping the right one.

No particular difficulty was experienced with the 6CL6 stage. A 47 ohm ½ watt resistor was placed in the grid to damp any tendency toward self oscillation.

Final Amplifier

A 6146 was selected for the final amplifier mainly due to the space limitation of the cabinet height. Thoughts of using a 6DQ5 were entertained, but cabinet height would not permit this. The 6146 was sub-mounted about 1" below the chassis. The rest of the circuitry is all straightforward with the exception of the screen voltage on the 6146. In the interest of keeping things as simple as possible, an 0A2 voltage regulator was used to keep the screen at 150 volts. There was a slight loss of power running the screen at this lowered voltage, but it was negligible.

A closed circuit key jack is mounted on the front panel. The cathode of the 6U8 mixer is connected to this for either a standby switch or a key for c.w. operation. The rig works very well on c.w. by turning off the audio, inserting carrier, and by plugging a key into the jack.

The Power Supply

The power supply is of the "economy" type described in the *Handbook* and therefore not shown here. It uses an old television power transformer and silicon rectifiers in a bridge configuration. It furnishes about 600 volts under load for the high voltage and about 300 volts for the low voltage.

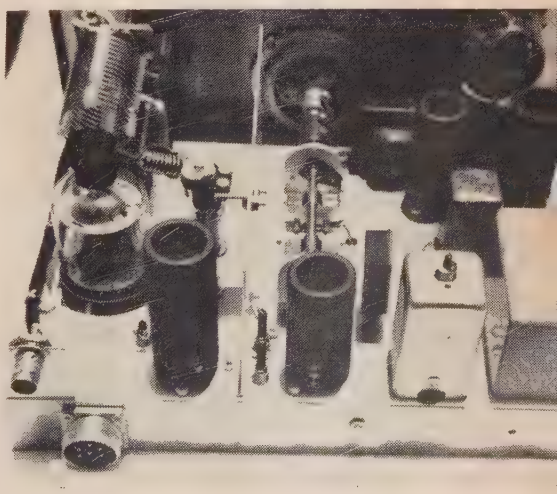
The bias supply uses a small 6.3 volt at 0.6 amp filament transformer "backed up" to the filament winding in the main power supply. An inexpensive power diode is used as a rectifier. The bias supply, shown in fig. 1, is mounted on the main chassis.

Tune Up

Tune up is quite simple. Carrier is inserted and all the 14 mc coils are resonated. It is advisable to use a dummy load and an indicating device such as the "Monomatch", to tell when maximum output is attained. If a "Monomatch" is not available, your receiver S meter is a good indicator.

When all 14 mc circuits are peaked, remove the carrier, unbalance the balanced modulator potentiometer, turn off the audio and peak the 5 mc i.f. can, and the 5 mc balanced modu-

[*Continued on page 116*]



Rear view of the filter type s.s.b. exciter. The 6CL6 driver and 6146 final are to the left of the shield partition. The neutralizing capacitor, C_2, is mounted on the left side of the partition. On the right side, mounted between the 6U8 and the partition, are L_3 and L_4. The v.x.o. tuning capacitor and crystal are in front of the 6U8. The 5 mc i.f. transformer is to the right of the 6U8 and the filter, Z_1, is in the right rear corner.

Improving The TRC-8 220 MC Receiver Conversion

BY ANTHONY SAVICKY*, W3JYL

THE local MARS group received a number of TRC-8 receivers and transmitters about the time that *CQ* ran the article on converting the receivers for 220 mc.[1]

It is possible some of you didn't have too much luck with the conversion and have either put them in storage or back in a corner somewhere meaning to look into them sometime in the future. Pull them out and put them back on the work bench and give it another go.

Some of the receivers, when converted, were very hot and needed no further work. Others did not perform too well and the forgoing is a description of the changes necessary to soup them up and sharpen the bandwith.

R. F. Stages

If the r.f. stage trimmer will not peak, disconnect R_1, a 47K resistor, where it junctions with C_7 and R_2 and ground it. This removes the fixed bias from the control grid and the trimmer will now peak nicely.

If the mixer or r.f. stages still do not peak up properly or satisfactorily, try adding a 3 to 7 mmf capacitor across the mixer and/or r.f. trimmer. This should do the trick.

I. F. Stages

Most of the receivers converted were fairly broad since they were originally f.m. units. The addition of 680 mmf capacitors (ceramic or silver mica) from the cathodes of each i.f. stage to ground was very helpful. To further improve the selectivity and reduce the tendency towards i.f. oscillation remove the second and fourth i.f. stage tubes V_5 and V_7. Now couple the grid to the plate of V_5 and the grid to plate of V_7 through a 20 to 50 mmf capacitor. The capacitors can be inserted in pins 1 and 5 of the tube sockets and if the results are satisfactory, permanently solder across the pins beneath the chassis.

Realignment

The i.f. strip should be realigned at 28.5 mc. The signal should be fed into the mixer through a floating shield. Connect the hot lead of the generator to the mixer tube shield and be sure the shield is not grounded but raised just above the base. A v.t.v.m. can be connected across the 180K load resistor in the modified detector circuit described in the conversion[2] and all i.f. adjustments set for maximum output.

Squelch Adjustment

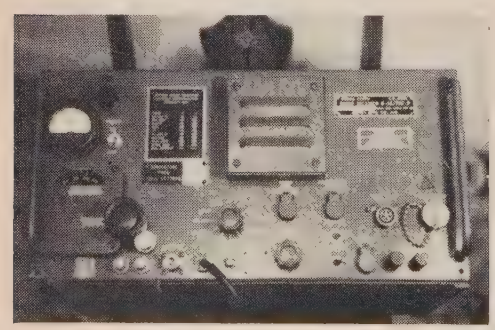
With the squelch switch in the ON position, adjust the SQUELCH control to where it just "plops" out. This setting will provide the greatest gain but with an increase in noise level. By turning the SQUELCH control a bit more clockwise the noise will reduce and the signals will come through loud and clear. Counter-clockwise rotation will increase the signal strength but the increased noise level makes it hardly worthwhile. The SQUELCH pot, actually the I.F. GAIN control, should not be turned up above the noise level generated by the r.f. stage if the best signal to noise ratio is to be obtained.

Adding A.V.C.

If you do not wish to bother adjusting the SQUELCH each time you tune in a new signal you can add a.v.c. The modified circuit is shown in fig. 1. The detector has already been modi-

[*Continued on page 118*]

*P. O. Box 73, East Petersburg, Pa.
[1]Grayson, K., SURPLUS, *CQ* May 1960, page 72.
[2]*Op. cit.*



Front view of the TRC-8 receiver modified for operation on 220 mc.

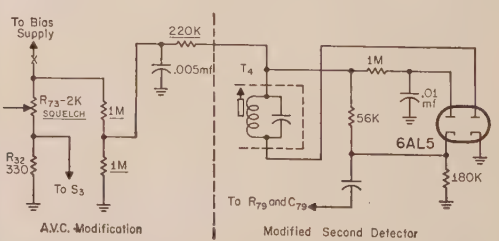


Fig. 1—The a.v.c. modification can be made as shown above after the second detector has been modified according to the previous conversion mentioned in the text. Only the parts underlined need be added and the resistors are ½ watt units.

The trunk was opened and there was the operator of the hidden transmitter. Left to right are, KØWFW, WØKEL, WØEZV, and WØTRA.

A Minneapolis Style Transmitter Hunt

BY H. T. (TOM) ORR*, WØWET

THE Twin City transmitter hunters were finally stumped one night—for a record time of an hour and a half, yet they were within a few feet of the hidden transmitter most of the evening.

The hidden transmitter in the Twin Cities has been located in so many different places that an unusual spot is difficult to find. It has been hidden on top of a ski slide, under buildings, under bridges and even aboard a boat on a lake. Most of the hunters are so adept that they arrive at the hidden transmitter in just a little over the minimum possible driving time. Moving transmitter hunts, during which the transmitter moves for ten minutes and parks for ten minutes, are common in the Twin Cities. Multiple transmitter hunts, during which the hunter must find first one, then a second, and then a third transmitter are old hat to the Minneapolis gang.

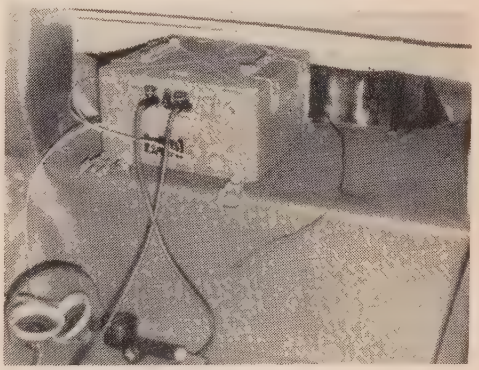
The location that stumped the gang the longest was one of the simplest. When WØWET came on the hunt as usual, unknown to the others, Gordy, WØKEL, was locked in the trunk of the car with a five-watt transceiver.

The hidden transmitter came on at 8 P.M., right on schedule. The signal at the starting location was, of course, quite strong. The hunters adjusted their loops and circled a few times, with WØWET doing the same to avoid suspicion.

As the hunters determined the apparent direction of the hidden transmitter, they drove out in search. WØWET's car kept driving in a small circle as if he were confused and were still checking on the bearing of the hidden transmitter. Since the transmitter, antenna, and Gordy were all hidden in the trunk, the signal faded out quite rapidly as the cars drove off.

The hunters soon realized that the signal was loudest around the starting location and came back. Since the Minneapolis hunts start on the edge of the Mississippi River, some of the hunters reasoned that the hidden transmitter must be somewhere in the bushes along the river bank.

The temperature was eight degrees above zero and the snow thick on the ground, but that didn't stop the hunters from tramping through the brush looking for the transmitter. Of course, to avoid suspicion, the occupants of WØWET's car got out and "looked" for the hidden transmitter.



The five-watt transceiver used as the hidden transmitter in the trunk of WØWET's car.

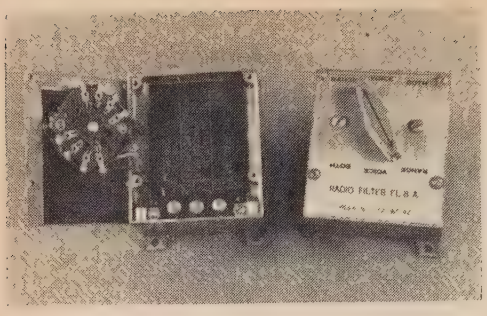
The hunters searched through the brush for over an hour, getting colder and angrier. Occasionally one would drive off a few blocks but would come back as the signal faded out. At one time one of the hunters was heard to exclaim, "Doggone it, I keep getting reflections off WØWET's car."

During this time Gordy was getting colder and colder. Being locked in the trunk of a car for an hour and a half is bad enough any time. When it is done on a cold winter night in Minnesota, it is really miserable. How Gordy managed to remain locked up in such a tight place for such a long time without going "stir crazy" is still a mystery.

As the evening went on, some of the hunters became suspicious and "inspected" WØWET's car, but could find only the usual receiving equipment in operation. One hunter was overheard to say, "Maybe he's in the trunk," but

[*Continued on page 116*]

*172 N.E. Logan Parkway, Minneapolis 21, Minn.



Internal and external views of the FL-8 audio filter, originally used by pilots as a radio range filter. The FL-5 version is similar to the FL-8 with the exception that the switch and cables are supplied as an external unit.

AN FL-8 ROUNDUP

BY DONALD L. STONER*, W6TNS

The FL-8 has been on the Surplus market for years and offers the amateur an inexpensive method of obtaining excellent audio selectivity. The following is a "roundup" of previously published material on the FL-8, all of which can be found in past issues of CQ.

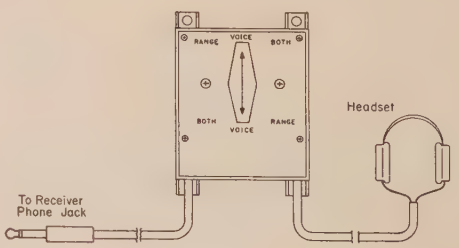
ANYONE who battles the c.w. QRM on 40 meters, or any other band for that matter, needs a razor sharp receiver. If you're loaded with loot, a 500 cycle Collins mechanical filter will provide a near perfect response curve. However, many people couldn't even afford to buy the socket for one. There is a much simpler and less costly way of achieving good c.w. selectivity, which brings us around to the FL-8 filter.

There are many ways in which this filter can be used. The FL-8 can be used by itself, can be cascaded, or the components can be removed to construct other filter configurations.

What Is It?

The FL-8 filters were made for aircraft installations and used for separating the range tone signal. With the switch in the RANGE position, the FL-8 passes only frequencies near 1020 cycles. All other frequencies are rejected.

*V.H.F. Editor, *CQ*.



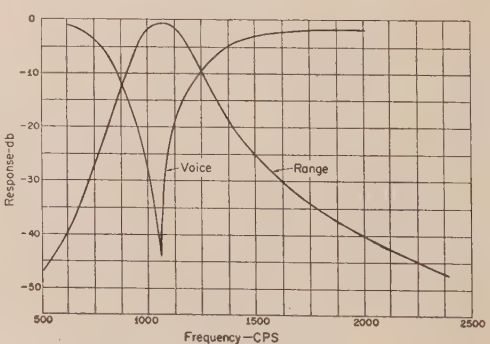


Fig 1—Method of connecting the FL-8 to your receiver and the approximate curves. The FL-8 is supplied with cables, while the FL-5 must be wired to cables. The range curve is normally used for amateur c.w. work. The filter introduces an insertion loss of about—12 db.

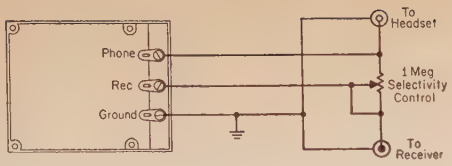


Fig. 2—Method of connecting a selectivity control to the FL-8 filter.

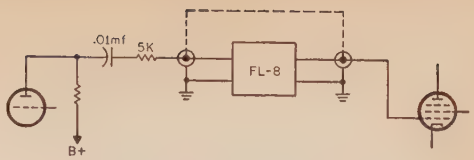


Fig. 3—For best results, the filter should be wired between audio stages.

In the VOICE position, frequencies in the vicinity of 1020 cycles are attenuated when all other audio frequencies are passed. When the switch is placed in the BOTH position, the input and output are connected together, which by-passes the filter. The radio beacon signals which the filter was designed, consisted of tone-modulated c.w. and voice modulation. A pilot could switch to the RANGE position to hear his beam signal without the interference from the voice modulation. If the voice information was required, he could flip the switch and null out the annoying tone.

What's It Good For?

The amater aupplications for this filter should be obvious. Simply by connecting the filter to your receiver and using it in the RANGE position, a tremendous increase in apparent selectivity can be obtained. Tuning the receiver with the FL-8 connected is a revelation. All signals will be in the background until tuning the receiver makes the beat note hit 1020 cycles. At this point, the filter passes the signal to the headphones where it can be easily heard. In other words, if you are listening to one signal which is tuned for maximum audio (and therefore must be 1020 cycles) other stations which are only a few hundred cycles away will be rejected.

Figure 1 shows the proper way to connect the FL-8. The input is connected to the headphone jack and high impedance headphones are used on the output. This figure also shows the characteristic curve of the FL-8 when used in this manner.

The VOICE position can also be used to advantage by c.w. men. Assume the band is relatively clear and you do not need to use the filter. If a station should come on and cause interference, you can switch the filter to VOICE and tune the receiver to drop the interferring station into the rejection notch. Many operators prefer to use the filter this way, for it avoids the annoying ring which accompanies the high selectivity in the RANGE position.

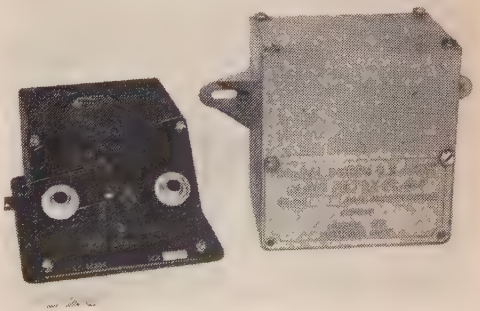
This ringing can be quite annoying if you listen to c.w. stations with the FL-8 for a long period of time. It is possible to make a selectivity control simply by wiring a potentiometer between the input and the output of the filter. This will allow you to broaden the filter response to any degree you wish. A circuit for connecting the potentiometer is shown in fig. 2[1]. A minimum of one megohm should be used for the potentiometer to prevent deterioration of the filter *Q*. The potentiometer can be mounted on an aluminum plate and secured to the two lower corner screws which hold down the FL-8 cover. This makes a neat and simple installation. If the control seems to be "crowded" at one end, try reversing the two leads. With an audio taper potentiometer, it should be possible to obtain a smooth selectivity control.

What's Wrong With It?

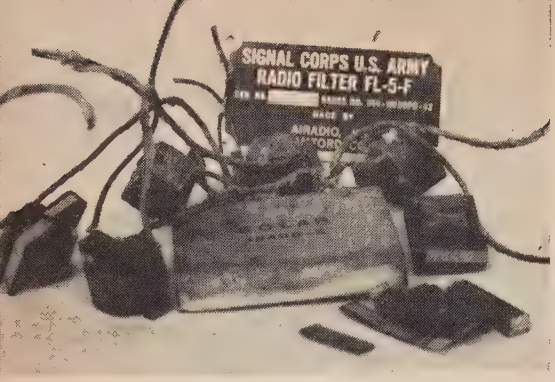
Unfortunately all is not "beer and skittles" with the FL-8. There are two problems associated with using it in your station. The most important one, which may or may not affect you, is that of receiver drift. For example, a ham friend always used to brag about the stability of his BC-348. This ended promptly when he acquired an FL-8 and connected it to the receiver. The additional selectivity provided by the filter, made it immediately obvious that the receiver left something to be desired. You may also find that your receiver is not rock solid. If it is not, the FL-8 will certainly show it up. The simplest solution is to either trade it in on a better "inhaler" or permit the receiver to warm up well before you plan on using it.

You have more control over the second problem involved in using the FL-8. The filter is designed to look into an impedance of 5000 ohms, but unfortunately most headphones are 2000 ohms or less. In addition, the impedance of headphones vary widely over the audio spec-

[1]Tyskewicz, J. P., "Variable Audio Selectivity With the Surplus FL-8 Filter," *CQ*, May, 1950, p. 28.



Here is a view of the FL-5 audio filter and its remotely located switching unit.



The six inductors of the radio range filter may be removed and reassembled as a filter shown in fig. 6.

trum. It is possible to minimize the loading by connecting a 2000 or 3000 ohm resistor in series with the headphones, but this of course increases the insertion loss. The best method of employing the FL-8 is to wire it into the receiver between the first and second audio stages. This can be done by installing two headphone jacks on the rear apron. The coupling capacitor is then disconnected from the grid of the audio output tube and wired to one jack. The other jack of course would be connected to the grid of the audio output tube as shown in fig. 3. The FL-8 input would connect to the first jack and the output to the other. When the FL-8 switch is placed in the BOTH position, receiver operation is not affected. A 5,000 ohm resistor should be connected across the filter output in such a manner that it is disconnected in the BOTH position.

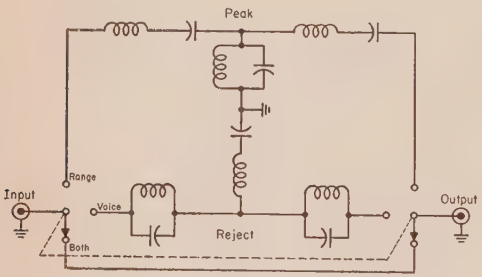


Fig 4—Schematic for the FL-8 filter.

How About Several Filters?

The stock filters can be cascaded to produce an extremely selective unit. A unit such as the one described by Ford[2] contains four cascaded FL-8s. The selectivity of this ultimate c.w. adapter is fantastic. The band width at –6 db is 160 cycles and at –60 db only 400 cycles. Thus, the filter is approximately 20 times more selective than the typical amateur receiver. In effect, an adapter such as this makes a c.w. band 20 times as large. Once again, this points out the need for stable receivers, for with this selectivity, the audio output falls off at a rate of about 1 db for every 2 cycles change in frequency!

[2]Ford, G. C., "SAF-4—The C.W. Man's QRM Eliminator," *CQ*, Nov. 1957, p. 60.

Inductances Used In FL-8A Filter		
Marking	*Lead Colors*	*Approx. Inductance, mh*
AM	Red, Green	2700
BM	Yellow, Blue	3500
31M	Black Brown	42
34M	Red-White, Green-White	225
35M	Blue-White, Green-White	225
37M	Black, Brown-White	750

Fig. 5—Filters made by UTC carry this inductance code. Others will have to be determined with an impedance bridge.

What's Inside?

It contains six tuned circuits; three in a peaking filter and three in a notch filter. The nominal frequency of either filter is 1020 cycles. A switch on the front panel can be used to select either filter or straight through operation. A circuit diagram of the F-8 is shown in fig. 4. This circuit is also the same for the FL-5. The only difference between these two units is the built-in switch. There is a third unit which was used by the Navy and identified as a radio beam filter, stock number (R)16-F-2150. This unit is very similar to the FL-8 with the exception of panel layout and number of jacks. Electrically they seem to be the same and the material which follows is applicable to all three filters.

The approximate value of the six inductances contained in the FL-8 filter is given in fig. 5. The code numbers are marked on the sides of the coils. Fig. 5 also shows the color coding of the leads. These identifying markings are only applicable for the coils made by UTC. The coils have an air gap core which may be adjusted by changing the tension on a pressure screw. This permits the inductance value to be varied for peaking the filter. The six coils have a nominal Q of approximately 12.

How Do I Get Into It?

The coils can be removed from the can by brute force, (a hack saw) but be careful not

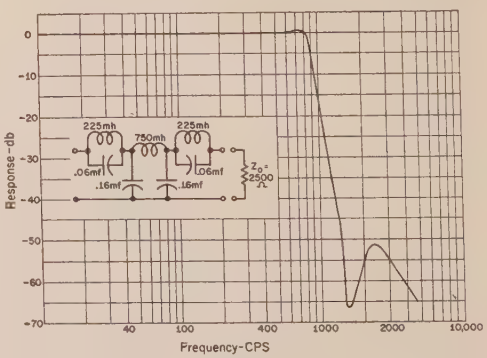


Fig. 6—A low-pass filter which can be made from FL-8 parts and its response curve.

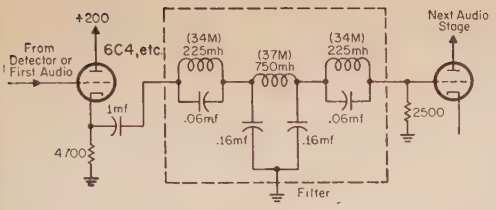


Fig. 7—Recommended method of connecting the filter shown in fig. 6.

to damage the components. A better method is to file off the rivets securing the bottom plate and remove the switch. In the case of the FL-5, the cover unscrews to reveal the terminal lugs. Unscrew the identification plate on the FL-5 to expose the coil chamber. When you know the XYL will be away from home for an hour or two, put the filter on the stove and heat it to get the wax out of the coil chamber. Be sure to put the filter in a pie plate to catch the drippings or you will have to make some embarrassing explanations when she gets back! When the wax is soft in the FL-5, lift the terminal plate and clip the wires. This will also reveal six screws which must be loosened by turning counter-clockwise eight or ten turns. Clip the leads to the capacitor block and terminals. The coils may then be slipped out of the channels after the adjustment screws have been loosened.

What Can I Do With The Parts?

These coils can be rearranged to make a low-pass filter with a sharp cut off at 1020 cycles The notch at this frequency should exceed –65 db with the circuit shown in fig. 6[3]. This filter consists of a constant-K section coupled to two M-derived half end sections constructed from the 225 mh and 750 mh coils. The filter exhibits a sharp cut off characteristic and constant impedance of 2500 ohms. The response curve is also shown in fig. 6.

[3]Talpey, R. G., "Low-Cost Audio Selectivity," *CQ*, Sept. 1948, p. 27.

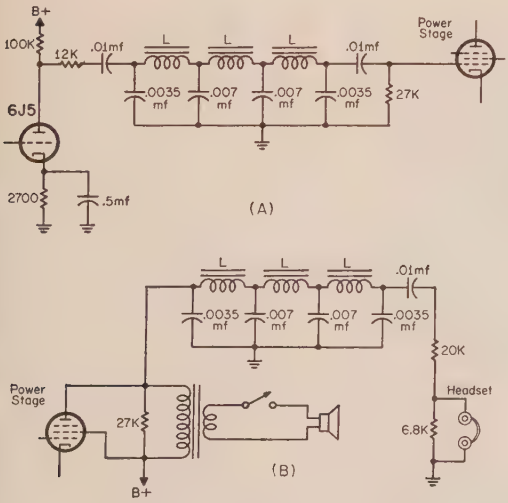


Fig. 8—Another filter configuration which can be made with FL-8 parts and two ways of connecting it into the receiver. (See Text.)

Red blooded experimenters may wish to improve on the filter by adjusting the value of inductance. This can be done by bridging the coils to the exact values given in the table fig. 5. It is possible to bend laminations to vary the inductance. In addition, the I-lamination can be spaced away from the E-stack. Actually, the I-laminations can be completely removed. If this is done, the inductance value will drop to approximately 10% of the original value and the Q *will* increase. The formula for determining L and C for a given frequency are as follows:

$$L = \frac{R}{\pi fC}$$

$$C = \frac{L}{R^2}$$

Where: L is inductance in henries, C is capacitance in farads and R is the terminating resistance. The input capacitance should be ½ C and all others, C. It is also possible to cascade more sections if desired.

Once the proper filter characteristics have been obtained, the circuit may be repotted or the components may be mounted on a new chassis. The circuits shown in fig. 7 provides near optimum performance with this rearranged filter. The cathode follower matches the filter impedance very well. The blocking capacitor is important to prevent d.c. flow in the filter. If this were omitted, the d.c. would saturate the inductances and change their value considerably. Another filter which can be made from the FL-8 inductors is shown in fig. 8. It consists of a three-section constant-K filter which may be wired between audio stages as in (a) or in conjunction with headphones as in (b). This filter will be somewhat broader than the preceding circuit but may be preferred by some users.

The characteristic impedance of this filter is approximately 27,000 ohms and it is necessary to use a resistor isolation network to prevent the headphones from upsetting the termination impedance. A constant-K filter of this type exhibits attenuation of –6 db per octave, times the reactive elements in the filter. In fig. 8, there are four capacitors and three inductors. Thus, the attenuation is 6 × 7 or 42 db per octave. M-derived circuits provide steeper skirts but also exhibit less attenuation outside the pass band. The Q of the FL-8 should not effect the attenuation outside the pass band. Low Q will cause a rounding of the curve where the attenuation starts to become noticeable. ■

A 6 Meter Transmitter

"The Li'l One"

BY WILLIAM J. RYAN*, WA2DND

This 6 meter transmitter can put out a clean 12 watts and is made from parts salvaged from a discarded TV receiver. The unit is ideal for fixed or portable operation.

"SIX meters? Sure, I've thought about it—I hear tell there is very little QRM, lots of good local contacts."

"Yeah, but I'm all set up and just can't see spending lots more bucks—down here on twenty a gallon is the only answer."

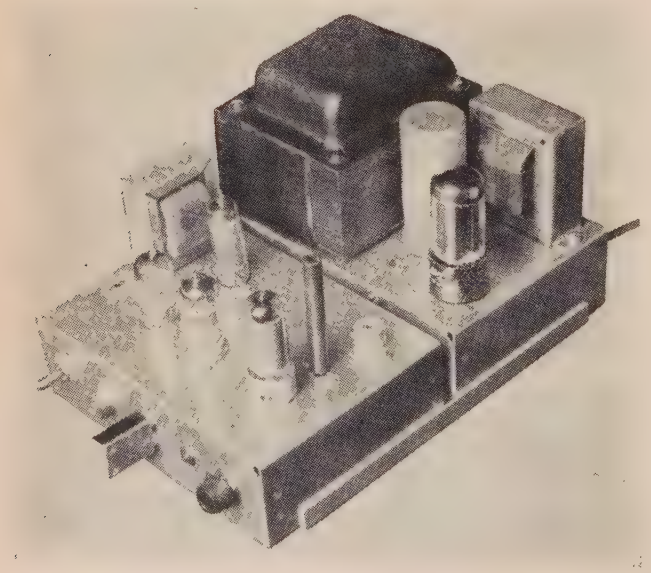
You most likely have heard these sounds at a club meeting or on the air. Before you pass judgment, take a look at the low end of the v.h.f. spectrum. The 50 mc band enjoyed an upswing when the FCC opened it to the technicians. During the period of high sunspot activity, F_2 openings provided many transcontinental contacts. Sporadic E openings and auroral contacts of 400-800 miles are still possible seasonally. All these make 6 an interesting band, but reliability and local contacts make the band lots of fun. High power is not a prerequisite; many commercial rigs of low power have long enjoyed popularity. The old v.h.f. myth of line of sight operation is long gone. A 40 to 50 mile dependable radius is common using only 6 to 10 watts.

*Instructor of Electronics, Gloversville High School, Gloversville, New York.

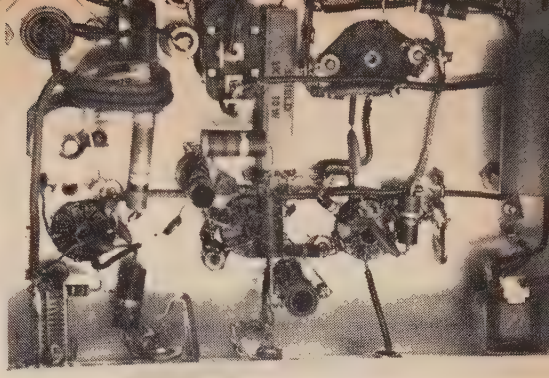
Let's look at this serious business of cost. In building a new rig, it is always desirable to have a source of inexpensive parts available—back to the old faithful junker, TV. The "Li'l One" utilizes coil forms, transformer resistors, disc capacitors (from tuner), chokes, etc., all from old TV receivers. Many of the other components are readily available from WRL, Olsen, Barry's, or other surplus parts warehouses. With careful buying and clever scrounging, a cost figure of under $15.00 is very realistic.

The Transmitter

The transmitter uses a simple slug tuned oscillator in which inexpensive 8 mc crystals are used. The first half of the 12AT7 is tuned to 25 mc. The second half of the 12AT7 doubles to 50 mc; this also is slug tuned. The final tube, a 5763, is operated straight through as a class C modulated r.f. amplifier. This tube was selected because its natural resonant frequency is in the 50 mc region. The final is link coupled to a series tuned antenna of 52 ohm impedance.



Overall view of the "Li'l One," an inexpensive, low power six meter transmitter. Two 5 × 7 × 2" aluminum chassis are fastened together with short lengths of ½" aluminum angle stock. The front row of tubes are l. to r. V_3, speech amp.; V_1, osc.-mult and V_2, r.f. amplifier. On the front panel are l. to r. *on-off switch, mike, crystal, key jack,* and *plate loading.* The bakelite shaft tunes the plate *tuning* capacitor.



Underside view of the transmitter chassis showing parts placement. Toggle switch S_1 is located next to the 2k 5w resistor at the top center. Below S_1 is V_1 with L_1 on the lower left and L_2 on the upper right.

The audio section consists of a grounded grid carbon microphone input stage to drive the speech amplifier. This is capacity coupled into a 6AQ5 choke modulator. A carbon button from telephone company surplus makes an excellent microphone.

Power Supply

The power supply transformer, filters, and choke all come from the same old TV. If low budget purchasing is necessary, many of the previously-mentioned parts warehouses offer low cost transformers, etc.

The model I am using was built on two chassis with the thought that if mobile operation is desired it is a simple matter to provide power to an octal plug and not require any wiring changes.

Construction

Construction is simple and should present no serious problem. Parts placement in a v.h.f. transmitter is ruled by short leads; all bypass capacitor leads should be less than ½-inch long. The use of ceramic disc-type capacitors is also where a v.h.f must. In mounting tube sockets, be careful to orient them properly. Coils L_1 and L_2 are both slug tuned ¼ inch chassis mounted types. Be careful not to ground the plate tank tuning capacitor. A non-

[*Continued on page 114*]

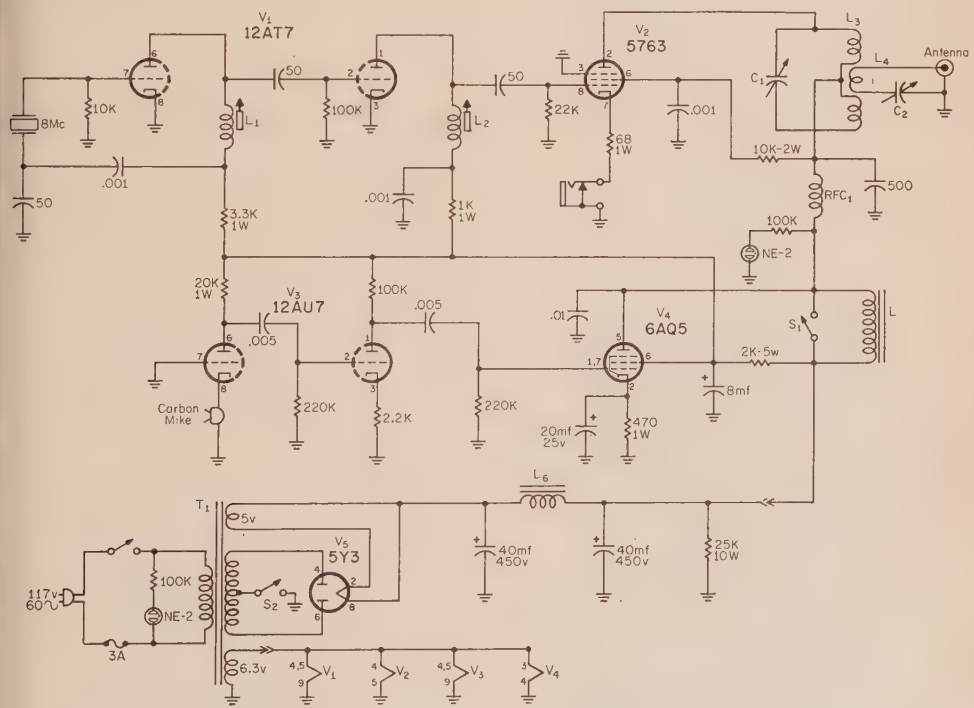


Fig. 1—Circuit of the 6 meter transmitter and the power supply for fixed operation. Switch S_1 is for C.W.-Phone. All capacitors less than one are in mfd, more than one in mmf and those polarized are electrolytics. All resistors are ½ watt unless otherwise marked.

C_1—APC 50 Hammarlund or equivalent.
C_2—30M11 Johnson or equivalent.
L_1—27 t #26E on ¼" slug tuned form.
L_2—10½t #26E on ¼" slug tuned form.
L_3—5t c.t. B & W 3010 stock.
L_4—3t insulated hook up wire on cold end of L_3.
L_5, L_6—Filter chokes as explained in the text.
RFC_1—Ohmite Z-50.
T_1—700 v.c.t. at 150 ma, 6.3v, 5v. (TV surplus).

A Forty Meter Vertical Beam

BY ROBERT S. DIXON*, W9OKN

This unique "beam" features three fixed verticals that are phased and oriented electrically by a 6 position rotary switch located in the shack. It has a theoretical gain of 5 db over a reference dipole with the added advantage of a null in the back to reduce QRM. Since the separation of the verticals is a quarter wavelength, the installation can be managed in the average back yard.

In recent months, propagation conditions on the 20, 15 and 10 meter bands have become increasingly poor. This has caused many a DXer to cast fond glances at 40 meters, only to discover that his antenna system was woefully inadequate for DX work on that band.

On the higher bands, a two or three element yagi-type beam is quite common but for 40 meters they become rather unwieldy and quite expensive.

The antenna to be described here has these attractive features:

1) It will fit into the average size yard.
2) It can be built for about $100.00, including all coax, connectors, etc.
3) It has a gain of 5 db, plus the blessing of vertical polarization, giving an extremely low angle of radiation.

Essentially, the idea is this: Three forty meter, vertical ground planes are arranged in an equilateral triangle, such that each one is a quarter wavelength away from the other two. Coax lines are run from each one to the shack, where a six-position rotary switch electrically rotates the beam in steps of 60°, by means of a phase shifting arrangement. If the lot isn't large enough for 3 you might try two.

Principle Of Operation

A top view of the two verticals is shown in fig. 1. Suppose that we feed both A and B with equal lengths of feedline. To an observer on the left, the signal from A seems to have a one-quarter wavelength "head start" on the signal from B, since it is that much closer. Suppose that we now place an extra quarter wavelength of feedline in the line going to A. This causes the signal from A to be delayed one quarter wavelength, so that to an observer on the left the signals from A and B are in phase, and therefore they add up to produce a stronger signal than either A or B would alone.

To an observer on the right, with the original equal-length feedlines, it seems as if the signal from B has a one-quarter wavelength "head start" on the signal from A. If we now insert the extra quarter wavelength of feedline in the line to A again, this delays the signal from A an additional quarter wavelength, so that to an observer on the right the signals from A and B are now one-half wavelength out of phase, and therefore they cancel each other out. The overall directional pattern with this type of an arrangement turns out to be a cardioid as shown in fig. 2.

In this application, three verticals are used, and each has its own equal length feedline running to the shack. There, a switch selects any two and places the extra quarter wavelength of feedline in series with one of them.

*502 Toepfer Avenue, Madison, Wisconsin

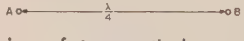


Fig. 1—Top view of two verticals separated by ¼ wavelength.

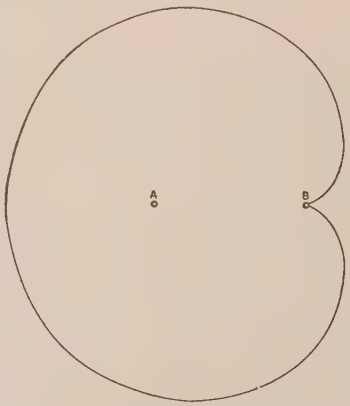


Fig. 2—Cardioid radiation pattern results from the insertion of a ¼ wavelength delay line in series with antenna A.

Switching System

The switching system used is illustrated in fig. 3. The rotary switch, a shorting type, should be housed in a shielded container (large coffee can will also do) and all lines should enter and depart through coax connectors.

The three feed lines to the antennas are of equal length but the 52 ohm line to the switch is fed through 75 ohm matching stubs and an additional ¼ wavelength line for the 90° phasing.

The lengths of the three stubs may be calculated as shown below.

$$\frac{\lambda}{4} = \frac{(246)\ (Veloc.\ Factor)}{Freq.}$$

The velocity factor for regular coax is .66 and .75 for the new polyfoam type.

Matching System

The gamma match method of impedance matching was chosen for two reasons[1]:

[1] Boss, B., "The Gamma-Matched Ground Plane," *QST*, November 1960, page 15.

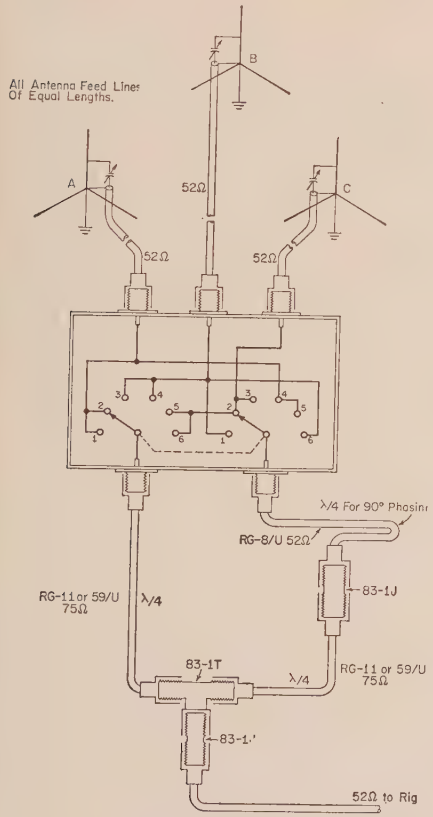


Fig. 3—Pictorial diagram of the antenna switching arrangement. Matching stubs and phasing line lengths may be calculated as explained in the text. The lettered antennas correspond to those in fig. 4. The selector switch may be a Centralab JV-9004 mounted in a 7 × 5 × 3" Minibox.

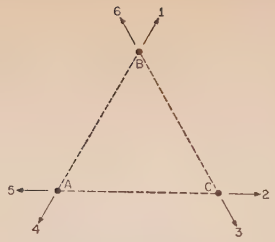


Fig. 4—Diagram illustrating the equilateral triangle configuration made by the three vertical elements of the 40 meter beam. Numbers indicate directions of fire as selected by the rotary switch.

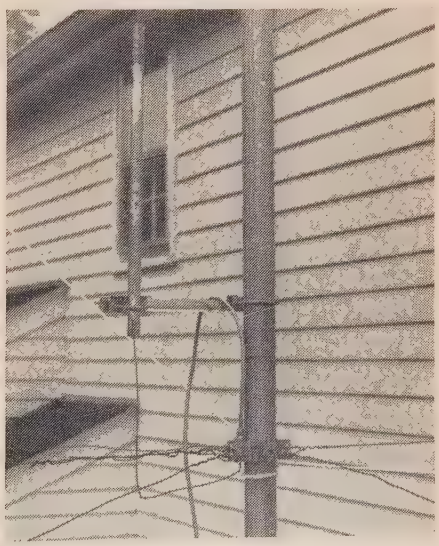
1) Its great versatility permits the use of a wide variety of coaxial lines.

Also, it will handle with ease the impedance variations of the verticals caused by different radial arrangements and by nearby objects, such as trees, houses, etc.

2) It greatly simplifies the mechanical construction of the verticals by eliminating the need for any base insulator.

This method is used as follows: On each tower, at a point one-quarter wavelength down from the top end we connect the radials and the outer conductor of the coax to the tower. This makes that point a voltage minimum point and hence if we were to connect the center conductor here also, the coax would see zero impedance. The top of the tower, however, has become a voltage maximum, and if the center conductor were to be connected there, the coax would then see a very high impedance. What we want is something in the 50-70 ohm range, so we use a movable clamp to fasten the center conductor to the tower somewhere in between the top and the radials.

But consider what we actually have connected to the coax now. We have one big



View of the lower portion of the Gamma match. One side of the SO-239 connector for the feedline is shaped to fit the contour of the mast.

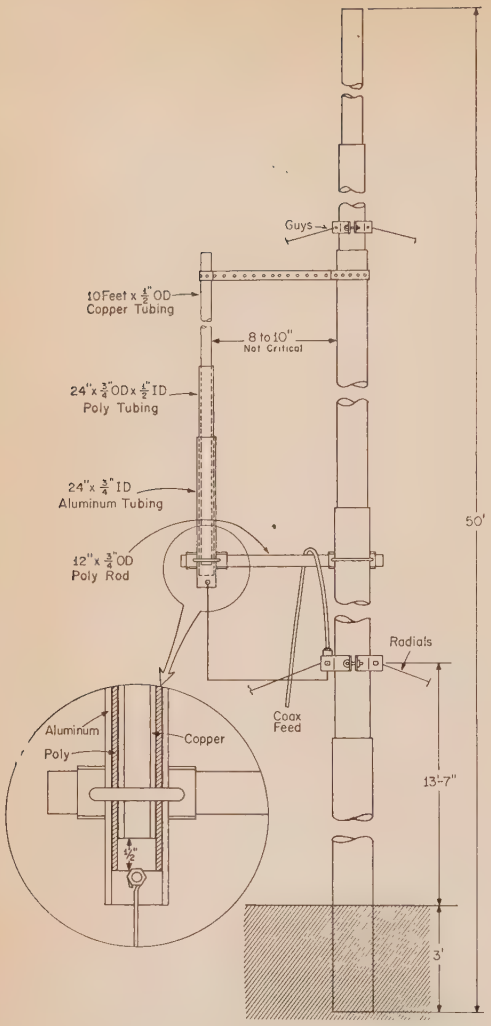


Fig. 5—Construction details of one of the three 40 meter quarter-wave verticals. The top clamp of the Gamma match is made of perforated soft iron ribbon. Note that the Gamma match capacitor insulator is made from two standard 12" lengths of poly tubing.

loop of conductor connected between the inner and outer conductors of the coax. This amounts to quite a large and undesirable inductance, which must be tuned out by using a variable capacitor in the lead running from the center conductor of the coax up to the movable clamp. The capacitor is made up of two concentric telescoping tubes with polystyrene tubing dielectric between them[2]. This type of capacitor is used to obtain long term stability and weatherability. The construction of the gamma match is shown in fig. 5.

Construction

The towers are held up by two sets of guys—the radials at the 14 foot level and by a non-conducting set at the 27 foot level as shown in fig. 5. The latter guys must be non-conducting so that they will not interfere with the radiation properties of the antenna. The radials are fastened to the tower with TV guy connectors, and the upper guys with one of the guy rings furnished with the tower.

Raise the towers one section at a time using only the upper guys, and after all three are secured install the radials and gamma matching sections. When you are laying out your radial system, keep these two things in mind:

1) You are trying to approximate a conducting sheet extending about a quarter wavelength out from each tower, therefore use as many radials as practical.

2) Any currents that flow in the radials will flow either toward or away from the tower, therefore no interconnecting wires between the radials are necessary.

Place a coax connector between one of the bolts of the guy connector and the mast, on each tower. Wrap the ground lead around each radial two or three times, and solder. Fasten the center conductor lead to a bolt through the bottom of the outer tube of the gamma capacitor.

Tuning And Adjustment

Put an s.w.r. bridge in one of the coax lines near the transmitter end. Place the movable clamp about eight feet from the bottom of the gamma rod, and set the capacitor about three-fourths of the way in. With the aid of a helper at the transmitter, adjust the capacitor for minimum s.w.r. (with the power off while adjusting!) and note this result. Then raise the movable clamp a few inches and readjust the capacitor. If the minimum s.w.r. is now lower than before you are moving the clamp in the right direction. If not, the clamp must be moved the other way. Continue on in this fashion, each time adjusting the capacitor for minimum s.w.r. If your measurements indicate that the clamp must go higher than the upper end of the gamma rod, move the entire capacitor assembly higher up the mast and proceed as before.

If no combination of adjustments produces an s.w.r. of less than 1.2 to 1 try raising or lowering the guy anchor a few inches. This will effectively change the length of the antenna. Then repeat the adjustment procedure. Do not be surprised if the position of the clamps on different towers are not the same, since various radial arrangements and nearby objects will affect each tower differently.

After all three are tuned independently, feed them two at a time with the switching arrangement, and again measure the s.w.r. in each of the three lines. It will probably be a few tenths higher than it was before, but a very small adjustment on each one will return the s.w.r. to its previous low value. It should be possible to maintain an s.w.r. of better than 1.2 to 1 over at least 150 kilocycles.

[*Continued on page 106*]

[2] Reynolds, F., "Simple Gamma-Match Construction," *QST*, July 1957, page 30.

KG1CC, Camp Century

BY LUTHER T. CRUSE, JR.*, W4TDT

Camp Century, located close to the North Pole is the first amateur radio station to be powered by Nuclear energy. This remote outpost, designed to study polar ice cap conditions, enjoyed contact with the outside world via KG1CC when mail deliveries were non-existent.

CAMP Century was built as an experimental under-the-snow camp for various research and development projects of the Army. The U.S. Army Corps of Engineers, using troops and personnel of the Polar Research and Development Center, completed Camp Century in the fall of 1960. Camp Century is the first major installation to be built under the surface of the snow. The camp contains 30 prefabricated buildings, including a nuclear power plant, and modern living facilities for about 200 men.

To build the camp under the snow, the "cut and cover" method was used. The Swiss "Peter plow," similar to the snow plows used for snow removal on the Alpine roads, were used to cut trenches 18 to 26 feet across, at the base and from 30 to 50 feet deep. The tunnels vary in length from 150 to 1000 feet long. The trenches were covered with a corrugated steel arch, then the processed snow was blown back on top of the arches to give a roof, 6 to 12 feet thick.

The prefabricated buildings (see fig. 1) are 76 feet long, 16 feet wide and 8 feet high, with the exception of the motor maintenance building and the mess hall, which are 12 feet high.

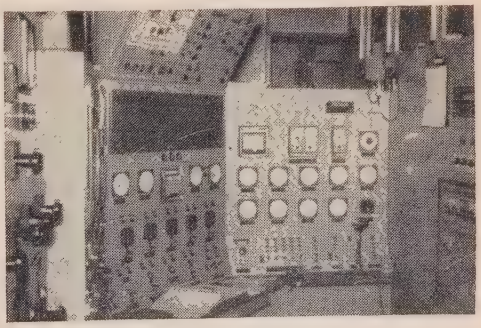
Location

The location of Camp Century, 138 miles northeast of Thule, 720 miles from the North Pole, makes it a very isolated post. It is supplied by tractor trains, called swings. The swing, powered by caterpillar tractors with extra wide tracks, pull as much as 140 tons of freight on sleds. The trains follow flag marked trails through the crevasse fields, and across the winter darkened ice cap. In a sub-surfaced camp of this type, two major problems were faced. First, fresh air was a problem, since any hole in the surface would fill up with snow, and second, in the summer months, when surface temperatures rise above freezing, the walls of the tunnels had to be protected from melting, making surface air impracticable. To solve these problems, several wells were drilled 40 feet down into the ice cap. These air wells were fitted with fans to pull the air from the porous snow, giving fresh, cold air plus maintaining a 15 degree temperature in the tunnels in the summer time.

Water, a necessity wherever man lives, is produced by feeding steam into a hole, 4 to 5 feet in diameter, and melting the snow. The water forms in pools in a bell shaped cavity, the result of the snow melting, and will not freeze as long as steam is supplied to the well. The water proved to be very pure and, at depths of around 100 feet, is thousands of years old.

The power to produce electricity, used for heat, light and communications, is provided by a small portable nuclear power plant. The power plant is of the pressurized-water, water moderated type, using the two loop system. Of interest to amateurs, is probably the reactor monitoring instruments and systems built by General Dynamics Corp. They are all solid-state (transistorized) and module construction. The control console is very compact and designed for very efficient operation.

This, now gives our camp, water, air and power. The camp was untried, and no army had spent the winter on the Greenland ice cap. William Cahill, Captain, CE. of polar Research and Development Center, was named Camp Commander for the winter months. Capt. Cahill canvased his crew for an amateur radio operator, promising to furnish a station to anyone obtaining a ticket. The "ole" bug was hunted out and cleaned up for a quick code brush up, the ARRL *License Manual* diligently studied and exam taken. W4TDT,



KG1CC and the entire camp under the Greenland ice cap is powered by Nuclear energy. Here is the atomic reactor control panel.

*838A Peterson Loop, Colyer Village, Fort Belvoir, Virginia.

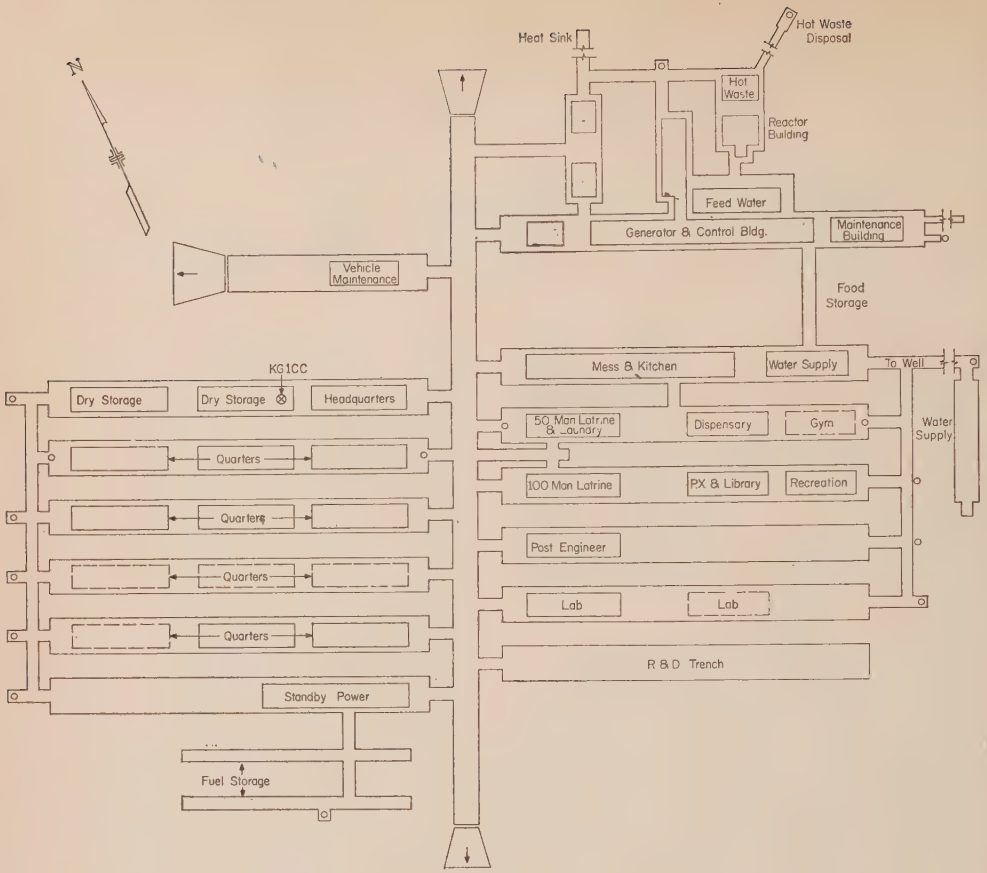


Fig. 1—The undeground layout of Camp Century has provisions for 200 men.

issued 10 November 1960, four days before departure for Greenland, made the morale prospects for the long winter night much brighter.

Upon arrival at Thule, it was learned that the equipment for the station had not arrived. Seems the requisition for the new Collins S-line had been delayed. A Greenland call was applied for, hoping the equipment would arrive by the time the call was assigned.

We departed the base camp at Camp Tuto, probably better known as KG1BA, by Polecat swing, (illustrated) arriving 35 hours later at Camp Century, seven hours after Thanksgiving dinner had been served.

Fourteen to sixteen hour work days were in progress to make the camp ready for winter.

In late December, it was learned the S-line requisition had been cancelled and new requisitions started through the red tape jungle. Arrangements were made with KG1BA to borrow a transmitter. They loaned us a KWS-1 which had been stored by W2ZK, and placed it aboard a heavy swing. The KWS-1 arrived minus interconnecting cables, instruction books, and antenna relay. The coaxial cable, sent along, was RG-11 instead of the RG-8 necessary for proper matching to the TA-33.

A portion of the supply building was used for the station. This required moving a wall so the station area could be heated economically.

Permission was granted to use the Military Communications circuit during light traffic hours, to get information from KG1BA on the KWS-1. RTTY instructions, copied from the Collins manual, gave circuit descriptions, loading instruction and general information. From these, cables were made up, circuits traced, relays improvised and restacked to make the R-388/U receiver "marry" the KWS-1 operationally. With the push to talk, v.o.x., c.w. key ct., and receiver muting operational, the next obstacle was the TA-33, still in a bundle of pipes and tubes.

After careful consideration, and having heard rumors that under the snow antennas had worked in Alaska, the beam was installed on the roof of the building, inside the tunnel. This proved very inefficient, since the steel tunnel roof, just 15 feet above the beam, absorbed the greater part of the signal. The beam was then moved to the topside and installed.

To be able to cover all the states, the CDR Rotor, which had arrived with the beam, was to be used. In order to keep the rotor from

exposure to the extreme elements of temperature and winds, we decided to install it on the roof of the building. The Signal Corps supply gave us several sections of aluminum tubing for a tower. These were pinned together to form a solid pipe. The boys from the Snow, Ice and perma-frost Establishment, measured and drilled a hole four inches in diameter from the surface down to the tunnel roof. A three inch steel pipe was inserted and snow filled in around the pipe. A bushing was affixed at the top of the pipe, to give a support for the tower, and to keep snow from blowing into the pipe. This, in effect, gave us a perfect support for the beam. However, the winter winds, expected up to 180 knots (which never exceeded 85 knots) had to be considered. The beam was kept to a height limit to 17 feet above the surface.

Antennas

The snow is 6500 feet deep at Century, so in effect we expected this to operate as a multi-gain antenna. Again, we were wrong. No gain was the problem. So, back to the books on antennas.

A conductivity check was taken on the snow. This proved to be 2 micromhos per centimeter. Our snow was a near perfect resistance of 500 K ohms per cc. A counterpoise was needed. Camp Century carries a copper ground on the complete electrical system, giving us a perfect under-the-snow counterpoise in all directions from the beam location. So, the beam was grounded to the camp electrical system. KG1CC was now on the air, but reports weren't too encouraging. Some RG-8 was discovered left over from camp construction, so the RG-11 was replaced. Our s.w.r. was still too great. The 4X250s went soft, so 4X150As were substituted since 4X250s were not available. Well, the 4X150s soon got too warm, the solder melted from the cooling fins, running down the side of the tube, through the air cooling sockets into the neutralizing plate below the tube sockets. This took a whole night

Below the ice, snuggled away in an underground barracks is KG1CC, the only contact with the outside world from Camp Century.

Forty feet below the surface lies KG1CC. Here, the author poses with the TA-33 which withstood winds in excess of 85 knots.

to locate, another night to rectify. To protect our last pair of 4X150s, we cut a three inch hole through the wall of the building, and pushed the power supply unit against the hole so the circulating air fan would pull in the tunnel air to cool the finals. We had the coolest finals in the "biz"—Air at 70 degrees below zero was pumped across the tubes. Melting solder was eliminated and reports immediately improved.

Larry, W4HNW, offered to get us the exact spacing for our TA-33 elements, as they had been installed on a hit & miss basis. The driven element proved to be eight inches off when the manufacturer's settings were relayed to us. This correction, made in darkness at sub-zero temperature again, improved reports.

Phone patch requests began increasing as the quality of phone patches improved. We were now another isolated traffic handling station looking for phone patch connections.

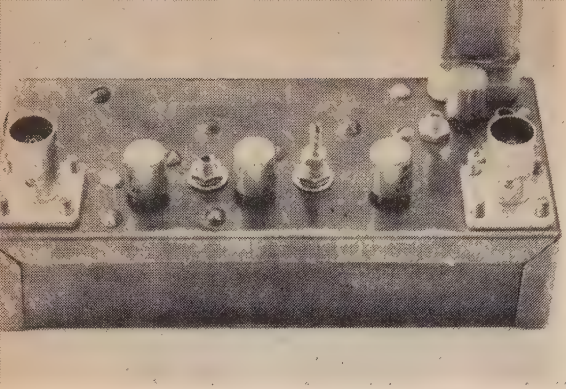
I would like to take this opportunity to thank the many operators that accepted and ran the phone patches and the many, many operators that would QSY when they heard our patches in progress.

When conditions were not favorable for phone patches, DX hunting took over. We contacted 76 foreign countries and 47 states, between January and April, all on 20 meter s.s.b.

On February 10, 1961, KG1CC became the only exclusively Nuclear Powered Amateur

[*Continued on page 114*]

Here's an example of the local neighborhood transportation found at the North Pole. This interesting creature goes by the handle of "Polecat Swing."



Top view of the 6 meter converter. The antenna input is on the left end followed by the two r.f. amplifiers and the mixer. The oscillator transistor is in front of the crystal.

2N1177s In A 6 Meter Converter

BY LARRY R. HOUGHTON*, K8ZVF

This crystal controlled transistorized 6 meter converter employs four transistors, has two r.f. stages and provides an output in the 80 meter band. It has sufficient gain to operate effectively with inexpensive receivers.

ALTHOUGH there are numerous vacuum tube, six-meter converter circuits available, very few transistor circuits have appeared. Most hams are unfamiliar with transistor theory and are reluctant to pay the up-to-now high prices for decent r.f. transistors for experimental purposes. The converter described in this article utilizes four RCA 2N1177's, currently selling for $1.65 each. These transistors operate up to 140 mc so they are well suited for six meter applications and may be considered for two meter work.

Circuit Description

The basic blocks of a converter are generally the same; Amplifier, oscillator and mixer. Transistors Q_1 and Q_2 form a two stage r.f. amplifier featuring good gain and extreme sensitivity. The oscillator, Q_4, operates at 46.5 mc which mixes with the 50 mc signal in Q_3 to produce a 3.5 mc i.f. Also, Q_3, provides some amplification at 3.5 mc. With an i.f. in the 80 meter band, this converter can work into any number of the less expensive receivers, such as the AR-3, BC-454, etc., with favorable results. For use with a more sensitive receiver some sort of gain control to eliminate overloading may be desired. The easiest method of providing this control is to vary the applied voltage with the aid of a potentiometer. However, the oscillator will cease operation when the voltage reaches a critical minimum value, usually 6 or 7 volts.

*6316 Grandmont, Detroit 28, Michigan

The converter draws 4.5 ma at 12 volts, 7 ma at 18 volts, and 10 ma at 24 volts. These low current drains suggest running the converter on batteries either at a fixed station or mobile. For mobile use a lower i.f. might be desired and could be accomplished by using a 49.5 mc crystal and decreasing the oscillator coil inductance and/or associated trimmer capacitance.

Construction Details

As can be seen in fig. 1, extensive shielding was used to isolate each amplifier stage, the oscillator, and the power wiring. A $4 \times 2 \times 1$ inch box was used although a larger box would not detract from the converter's performance. The .001 mf feedthrough capacitors and the 4.7 microhenry chokes were used with expectations of feedback problems. These can be eliminated as a first step in reducing costs, (see Cutting Costs). The power plug receptical was modified for a small space but with a larger chassis such a change should be unnecessary.

The dot notation on L_3 and L_4 indicates that the voltage at the top of L_4 is of the same polarity as that at the top of L_3. Therefore, L_4 should be wound in a direction opposite L_3 if the dotted end of L_4 is grounded. Or, if the undotted end of L_4 is grounded, wind it in the same direction as L_3. This procedure is necessary so that voltage feedback to the base of Q_3 will be in phase with the voltage already appearing there.

The metal shields between the two r.f. amplifier stages cross over the transistors so that

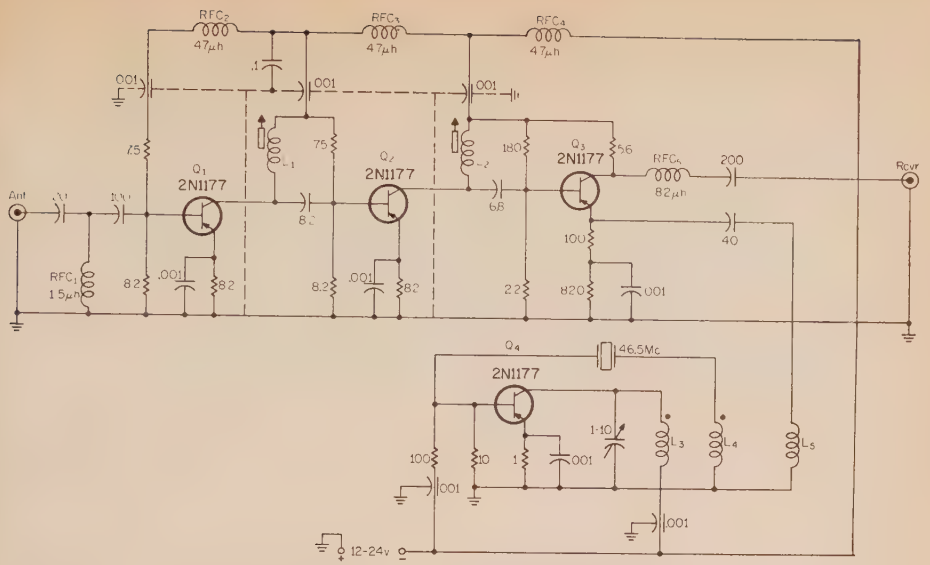


Fig. 1—Circuit of the 6 meter converter whose output is in the 80 meter band. All resistors are ¼ watt; capacitors greater in value than 1 are in mmf and less than 1 in mfd.

L_1, L_2—15 t #28 E. on Miller #4300 form.
L_3—18 t #28 E. on Miller #4300 form.
L_4—3½ t #22 hook up wire over L_3.
L_5—2 t #22 hook up wire over L_4.
RFC_1—1.5 μh, 16 t #24 E closewound on a 1 meg ½ w resistor.
RFC_2, RFC_3, RFC_4—4.7 μh, 21 t #24 E, closewound on a 1 meg 1 watt resistor
RFC_5—8.2 μh, 28 t #28 E closewound on a 1 meg 1 watt resistor.

the shield pin can be soldered to the metal shield.

Operating Details

First, determine that the oscillator is working. Place a grid dip oscillator (set for wave meter operation) near the oscillator coil and run the coil slug in and out for a meter indication. Once the oscillator is working adjust both the coil slug and its trimmer capacitance for a maximum meter indication. If the crystal does not oscillate, try another transistor or vary the number of turns on L_4.

In tuning the r.f. amplifier, the slugs of L_1 and L_2 are varied to obtain a suitable response. An oscilloscope, a sweep generator, and a 50 mc marker are desirable instruments for the adjustments. If they are not available, the following procedure may be used. Disconnect the 6.8 mmf capacitor from the base of Q_3. Connect a source of 50 mc to the converter input; turn on the power to the converter, and measure the voltage with an r.f. v.t.v.m. at the output side of the 6.8 mmf capacitor. If an r.f. probe is not available, a simple detector can be used as shown in fig. 2. Use as low a 50 mc signal level as possible so as not to saturate the amplifier. Now adjust the slugs of L_1 and L_2 for a maximum voltage. If a voltage is still read when the 50 mc signal is removed, the amplifier is oscillating and L_1 and L_2 must be readjusted for a maximum voltage without oscillation. In case 0.001 mf feedthrough capacitors are not used, it may be found that better amplification can be achieved by placing a .01 or .1 mf disc capacitor from the power lead input to ground.

After the amplifier has been aligned, replace the 6 8 mmf capacitor to the base of Q_3. Now connect an antenna to the input, connect the converter to a receiver, and tune in a six meter station on the 80 meter band. If much more than the bottom one megacycle of the six meter band is to be covered, slight readjustment will be necessary for best reception.

Since the amplifier is fairly broadband (about 5 mc wide between 3 db points), in strong TV signal areas the converter may pass some of these unwanted signals. A band-pass filter at the input of the converter will eliminate most of these signals but with some attenuation of the 50 mc signals.

A suitable band-pass filter is shown in fig. 3. Adjustment of C_1, C_2, C_3, and C_4 will determine the frequency of greatest attenuation. This can be adjusted anywhere from 52 to 55 mc. Six meter signals will be about 2 db down when the filter is used. However, the audio of channel 2 will be greater than 30 db down as well as the higher channels. Also, this filter

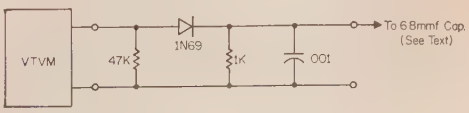
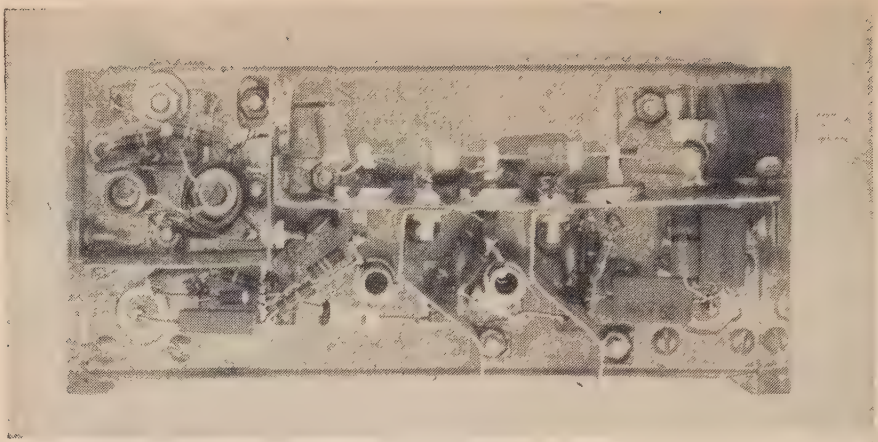


Fig. 2—A simple detector used as a probe in amplifier tuning, as described in the text.



Bottom view of the completely transistorized six meter converter. The shielded compartments from left to right enclose: crystal oscillator; power distribution; mixer; 2nd r.f. amplifier and 1st r.f. amplifier. The r.f. chokes are available from Jeffers Electronics Division, Speer Carbon Co., DuBois, Penna.

will work equally as well on the output of a six meter transmitter for those TVI problems.

Cutting Costs

Many hams, unfamiliar with construction practices, feel the parts list for various circuits must be followed exactly or the unit won't function properly. Such is not *always* the case. Old time hams were and are notorious for "making do" with parts destined for the junk can. Catalog price of all components used in this converter totals about $35.00. With a decent junk box and some ingenuity this price can be cut in half or even more.

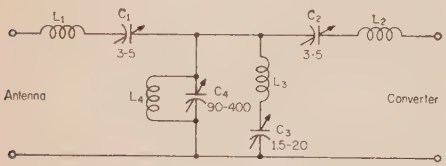


Fig. 3—Six meter bandpass filter can eliminate TVI and, if desired, can be used at the transmitter to reduce TVI.

As mentioned before, the power supply filtering can be eliminated and was incorporated only as an extra precaution against feedback. With all filtering shorted the converter worked equally well.

Coil forms can be replaced by resistor bodies as long as the inductance is the same. The major drawback here is that the inductance becomes fixed and is not tunable. A coil form should be used in the oscillator, however. The trimmer capacitor in the oscillator circuit is a piston type and offers smoother operation than the ceramic or mica types which could be tried as long as they cover the same capacitance range.

Quarter watt resistors were used in an effort to conserve space. Half watt resistors could be used with a larger chassis. The power leads can be passed through the chassis although plugs are more convenient. And, phono-type plugs can replace the BNC connectors used at the input and output.

The extreme sensitivity, compact design, and low operating voltages make this six meter converter a worthwhile project for fixed station, portable, or mobile use. ■

New Amateur Products

50 mc Low-Pass Filter

THE Gavin Instrument Co. of Somerville, N.J. has recently introduced two models of a 50 mc low-pass filter. The model illustrated comes complete with a forward indicating power meter with two scales; 0-40 watt and 0-400 watts. Another "Maverick" is available without the meter. The interesting innovation about this filter is that the five APC capacitors can be tuned from the top without opening the unit.

Shielding of all nine internal compartments is very well done. The filter comes in a gray hammertone box measuring 5¼ × 3 × 2". For more information check A on page 126.

OPERATION EXODUS

BY VINCENT A. LANGELO*, K2CMN

Two years ago last month the Burlington (N.J.) Civil Defense group staged an enormous evacuation drill. This is their story.

On the weekend of June 4-5th 1960, one of the largest Civil Defense evacuation drills ever attempted in the United States was conducted by the Burlington County Civil Defense Unit of Southern New Jersey. Briefly, the plan called for the mass evacuation of approximately 250 families from their homes to overnight accommodations located in the southern part of the county some 40 miles away. Amateur communications were used extensively throughout the drill in the form of the Radio Amateur Civil Emergency Service. These amateurs represent two-thirds of the total RACES membership and approximately one-quarter of all amateurs in the county.

Burlington County is the largest county in area in the state of New Jersey and is second largest in the number of municipalities.

Promptly at 0800 hours on June 4th, the county CD Net Control Station K2QGE, located at CD Headquarters at Mount Holly, N. J. was placed in operation. Net control frequencies were established on 2, 6 and 10 meters to link that headquarters with each of the municipal CD Control Centers. Also mobile stations in each of the municipalities used these net frequencies to keep in constant touch with Net Control and each other. Approximately 30 mobile stations were used for the entire drill. Amateurs who initially placed the Net Control station on the air were Bill Fisher, W2DBP, Bill Howser, K2VFZ and Hank Twitchell, W2WKI (County Radio Coordinator). Convoys consisting of approximately 10 cars were instructed to meet at their local CD Center. Each convoy consisted of at least one amateur mobile radio equipped vehicle, one vehicle carrying police or auxiliary police, one vehicle carrying medical personnel, and one support vehicle of a miscellaneous nature, either fire equipment, rescue truck, ambulance, canteen unit, gasoline tank truck, automobile wrecker or other necessary support vehicle.

At precisely 1000 hours, the civil Defense alert was sounded with sirens throughout the county and all radio amateur mobile stations were asked by Net Control to acknowledge receipt of the alert. All convoys were then instructed to leave their local CD center and proceed to the assembly area located at Haines Airport in Chatsworth Township which was approximately in the center of the lower portion of the county. At Net Control, the movement of all convoys was monitored and check points (9 in all) were radioed in to assure that the convoys were proceeding to the right direction.

Meanwhile, as the alert sounded, the Mobile Control Center was being driven by Tom Bethel, K2HJY (County Deputy Radio Coordinator) to the Reception Center at Chatsworth. Upon arrival at the center, he set up the antennas and equipment and was assisted by operators Denny Berger, WA2HUB, Gerry Kaufman, K2GZU and John Entwistle, K2ZZT. K2HJY and his assistants placed this Control Center in operation and assumed net control from Mount Holly at about 1100 hours. The Mount Holly Control Center was then on a standby basis for relay of traffic as needed.

Each convoy was funneled past a reception post, registered and reassigned to one of 5 lines (representing the 5 receiving municipalities). A CD representative was present to receive each car and to advise the occupants of their destination. Shortly after 1400 hours, all cars had been registered and 5 new convoys were ready to proceed to their prearranged camp sites. There was at least one mobile station assigned to each camp site and in some cases several. In addition, a pool of reserve mobile units was available to supply those sites requiring them. All convoys were then given the go ahead signal and started to their assigned site with each mobile station in constant com-

Closeup of the mobile control center with tower in position. Shown left to right: K2MOV, K2HJY, K2JAK, W2WKI, K2VKS.

* 209 Greenwood Ave., Mount Holly, New Jersey

munication with the Mobile Control Center. Special arrangements had been made for overnight accommodations at 22 camp sites located in each of the 5 receiving municipalities. In most cases the camp sites were existing gun club camps while others were hunting lodges. As soon as all convoys were well on their way to their destination, the Mobile Control Center turned over Net Control to the County CD Hdq. at Mt. Holly for about an hour while the Mobile Center was moved to its overnight field Hdq. at the Pine Cone Antlers Gun Club in Chatsworth. Meanwhile at Mt. Holly, Frank Biloon, K2ECY, Vic Vancza, K2GWK, Bob Jose, K2YEL, Vince Langelo, K2CMN, Walt Middleton, K2YBN and many others maintained Net Control handling traffic regarding food, cots, gasoline, emergency police protection, bug bombs and medical assistance. Incidently most traffic between Mt. Holly and the field Hdq. at Chatsworth was handled on the 6 meter net where reception of all stations was exceptionally good during all hours. Reception on 10 meters was useless except when mobile stations approached to within 15 miles of Mt. Holly. Two meter reception however was fair with about only half of the mobile stations being heard loud and clear.

Arriving at the Pine Cone Antlers Gun Club in Chatsworth, the Mobile Control Center was again placed in operation and assumed Net Control from Mt. Holly CD Center about 1600 hours. Also about this time traffic was quite heavy as most evacuees arriving at their respective camp sites found they needed cots, clothing, bug bombs and the numerous items which they needed and neglected to take with them.

As evening set in the Mobile Control Center maintained constant communication with all camp sites via mobile units and the Mt. Holly CD Center. All night watches were set up at the Mobile Center with 3 operators from 2000 hours to 2400 hours and 2 operators from 2400 to 0700 hours. Likewise the CD center at Mt. Holly was manned all night with at least 2 operators.

Thomas Bethal, K2HJY, (County Deputy Radio Coordinator) inside Mobile Control Center.

On Sunday morning all camps reported in to the Mobile Control Center and after breakfast they packed and readied for the return trip. All cars were permitted to return singly since not all cars of the original convoy were assigned to the same camps.

As is usually the case in such a large scale venture as this, it is impossible to name all the amateurs who participated in this CD drill. However it can be said that the entire drill was a success and amateur communications contributed in large measure to this success.

In a general sense, we learned much concerning the correct deployment of mobiles in convoy duty and the great need of such communications to all of the participants in an exercise of this type. We were dealing with only about 750 people this time; another time it could be 7500. It is time that we started to "think big" in terms of the service we are volunteering.

"Operation Exodus" was merely a drill to demonstrate amongst other things the effectiveness of amateur communications in an emergency. It will become very real indeed in the event of a major natural disaster of a nuclear attack. Such an attack is entirely possible in view of the increased international tension which has provoked some very strong threats from Mr. K. If he should elect to carry out these threats, then it is not difficult to imagine the disasterous results that would follow. However, it is the author's sincere desire to see all people settle their differences at a conference table and we hope and pray to God that such will be the case. In any event, the radio amateurs of Burlington County, New Jersey are ready, willing and able to carry out Operation Exodus whenever the need arises. How about your community; is it also prepared to act under similar conditions? Are you ready to serve for such a worthy cause? ■

Ham Hints

Don't Tear—Cut Plastic Tape

Don't try to tear plastic electrician's tape. The tape will just stretch, suddenly break and stick all together. This is just a waste of tape, time, and temper. Cut one of those blades from an empty cellophane tape dispenser and solder it to the lid of the plastic tape container. This cutter is always handy.

DX DX DX DX DX DX DX DX

URBAN LE JEUNE, JR., W2DEC
BOX 35, HAZLET, NEW JERSEY

The following certificates were issued between the period from April 5th, 1962 to and including May 3rd, 1962.

CW-PHONE WAZ

1668	W2EHN	Ellis W. Emery
1669	W9LQF	George J. Nesbed
1670	DJ2CM	Winfried Svenson
1671	K4JVE	Dr. Hal S. Johnson
1672	XE1CV	Carlos de Leon, Jr.
1673	DL3ZA	Klaus Weimann
1674	W6EKZ	Richard M. Rothschild
1675	GI3OQR	Dick Gibson
1676	SP9KJ	Jercy Szczesniak
1677	SM5BVF	Henry Bervenmark
1678	W2OKM	Robert N. Boulle

ALL-PHONE WAZ

143	DL3EA	Friedrich Horning
144	HB9MX	Kurt Bindschedler
145	XE1CV	Carlos de Leon, Jr.
146	VE6BY	Arthur R. Craig
147	W6EKZ	Richard M. Rothschild

SSB WAZ

59	KØRAL	Fredric L. Abrams
60	K4TJL	Wallace Carpenter
79	DL6EN	Gunter Heinzen
80	XE1CV	Carlos de Leon, Jr.
81	VE6BY	Arthur R. Craig
82	W4INL	Robert E. Moren
83	I1UA	Vieri Alamanni
84	W6EKZ	Richard M. Rothschild
85	OY7ML	Martin Haasen

CW WPX

306	HA5KDQ	Radio Club of Budapest
307	GI3OQR	Dick Gibson
308	PAØWOR	John Wortel
309	W3HA	Daniel I. Farren
310	WØOVG	Leland E. Eckerman
311	K6VVA	Rick Hilding
312	W8KSR	Jon T. Hodgin
313	W3GRS	Richard G. Weiler
314	G3HIW	F. G. Jarvis
315	PAØVER	John A. Verheij
316	WØRJV	Howard W. Clark
317	SM4BZH	Seppo Lilja
318	W6UDR	Paul V. Weller
319	K9GVE	Robert J. Sager
320	DL3TW	Gunter Pfannkuche
321	MP4BBE	J. A. St. Leger

PHONE WPX

65	HB9MX	Kurt Bindschedler
66	LU9DM	Jose Llorens
67	EA2EL	Federico Garcia-Ogarra

SSB WPX

99	W6USG	Paul Taylor Brogan
100	W4RLS	J. Foy Guin, Jr.
101	K5OGP	Erik A. Jensen

MIXED WPX

26	W3OCU	Hal Hogan
27	G3DO	D. A. G. Edwards
28	W8JIN	James W. Ringland
29	W8UMR	John M. Sulak
30	W9EXY	Donald A. Jensen
31	W4BFR	Bruce E. Montgomery
32	W4OPM	Charles J. Hiller
33	W2GNQ	J. A. Anderten

WPX ENDORSEMENTS

	Mode	Total	Continent	Band
W2HXG	Mixed			14
W3GRS	CW	365		
W3OCU	Mixed		F-S	21
W6UDR	CW	350		
W8KPL	CW		F	14
MP4BBE	CW	364		
VE3JZ	CW			14
ZL2GS	CW			14

A-Asia; *E*-Europe; *F*-Africa; *N*-North America; *O*-Oceania; *S*-South America.

WPX HONOR ROLL

CW WPX

W2HMJ	651
W5KC	556
W8KPL	553
K6CQM	552
W2EQS	547
W9YSX	544
W4OPM	531
K6KG	528
W2HO	526
W1IJB	513
W6WO	511
W2GT	510
SM7MS	510
W8LY	506
K2UKQ	505
G3EYN	503
W2NUT	502
W5LGG	502
W6YY	502
K2CPR	501
W1EQ	500
W2MUM	495
SM5CCE	488
YU1AG	482
W8PQQ	481
W9UXO	480
W4HYW	478
W9GFF	471
W3OCU	466
K6SXA	464
G2GM	462
K2ZKU	461
W3BCY	457
W4BYU	456
K9EAB	454
PAØLOU	451
W3PGB	450
DL1YA	450
W8JIN	449
W8RQ	445
W3BQA	437
K5LIA	428
OK1MB	428
W3CGS	426
W1EIO	425
WØPGI	420
HB9TT	419
OK3EA	419
W8IBX	416
W5AWT	412
W5DA	412
K5LZO	411
W2PTD	411
W4DKP	410
W1CKU	408
K4JVE	407
W5AFX	407
W2KIR	405
W4YWX	404
DL3RK	403
JA2JW	403
VE6VK	403
G3HIW	402
PY4OD	402
K2PFC	401
IT1TAI	401
W2RA	400
W9SFR	400
VK3KB	400

PHONE WPX

W8WT	546
G3DO	538
W9WHM	510
CT1PK	483
W9YSQ	471
MP4BBW	454
PAØHBO	453
W6YY	448
VK6RU	421
PZ1AX	413
TG9AD	381
DL6VM	376
G8KS	372
PAØSNG	369
W1UOP	368
K9EAB	366
SM3EP	361
W5ERY	358
W8JIN	356
W9UZC	356
DL3TJ	354
PY2CK	354
5A5TO	353
LA5HE	351

SSB WPX

W4OPM	400
MP4BBW	392
TI2HP	356
K9EAB	350
PZ1AX	345
W3MAC	329
W2VCZ	320
W8PQQ	315
HB9TL	315
G3DO	311
G8KS	302
W2HXG	294
K2MGE	273
WØCVU	271
K2TDI	264
W6YMV	261
W2YBO	257
W3VSU	256
UR2AR	255
TG9AD	252
W1ORV	250
G3NUG	250

MIXED WPX

W8JIN	605
W4OPM	595
W3OCU	588
G3DO	568
W8UMR	500

Mohd, AP5CP, was responsible for giving countless DXers a new country. Before he started operation only one abortive DXpedition on s.s.b. had operated from this country. Mohd describes his plight getting on the air in the text.

Here There and Anywhere

AP5CP, East Pakistan: "AP5CP was licensed in April 1952, and came on the air, for the first time, on 26 July 1961, thus depriving a new country from the 'ham' friends all over the world for a period of nearly 9 years. I was the only station in East Pakistan (Zone 22). AP5CP, therefore owes an explanation to the radio amateur world for its long absence. The aim of this letter is to explain the cause of this delay.

"The first condition for understanding this problem is that such ventures are extremely 'damp' in this part of the world, and no amount of zeal and enthusiasm helps one to complete the task. The equipment, which is the main item, is just not available anywhere. The local dealers do not import it as there is no market for them. It cannot be obtained from any local ham as there is no other ham here. The question of importing it does not arise because of foreign exchange difficulties. It is with these serious handicaps that this station initially commensed its work, and it is due to these difficulties that a long period elapsed without any success. However the hard and sustained efforts of nearly 8 years bore fruit and a 45 watt Panda Cub transmitter was put on the air on 26 July 1961.

"It will be heartening to note that, through the prompt and timely co-operation of large number of hams, particularly in the USA, and long hours of operation, this station progressed by leaps and bounds and in a short period of 8 months it managed to qualify for a large number of awards.

"This letter will not be complete without a word of appreciation for all these hams who have been so generous in making this station a success. Had it not been for their help and assistance, this station would never have come on the air. Let me express my heartful gratitudes through the courtesy of your magazine to all of them and particularly to the following for sending me books and magazines to make this station run successfully: W6YY, W1WPO, W4QCW, W4SSU, W6CYV, W5IGJ, WA6-DTA, W3VKD, W6CUQ, W1GYE, and VS1FZ. I am highly indebted to W4ML and W3CRA for sponsering me for A1-Op and RCC awards.

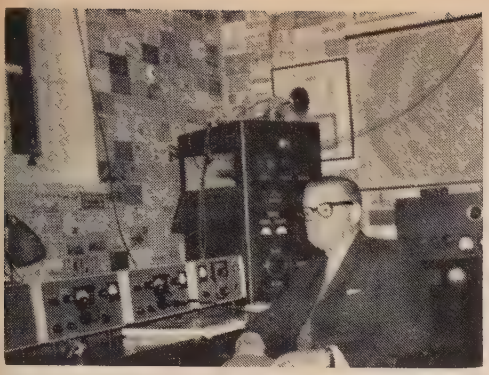
"Lastly, encouraged by my success I have persuaded three of my friends here to open up their stations with a view to be of some assistance during emergencies arising out of natural calamities like the devastating tidal wave here and cyclones of last year of which I am sure you are aware. I feel sure that the radio amateurs here would be very welcome to fill a little gap in the already very scanty communications during such calamaties.

"It is rather difficult to imagine the conditions under which I am operating. There is no other ham station, no guidance on ham matters, no junk stores to go to and no foreign exchange due to governmental restrictions and of course the import restrictions. However my thanks are

WAZ and WPX

THE WAZ and WPX certificates are awarded by the *CQ* DX department. WAZ is issued for proof of contact with the 40 Zones of the world as shown on the official WAZ Zone Map. WAZ is issued in three classes, *i.e.* Any mode, all phone and all s.s.b. For complete rules, see the January, 1962 *CQ*, page 50.

WPX is issued in four classes, *i.e.*, all c.w., all phone, all s.s.b. and Mixed. The number of prefixes required are: C.w.-300; Phone-300; s.s.b.-200; Mixed-400. For complete rules, see January, 1962 *CQ*, page 52. WAZ applications, Zone Maps and WPX applications may be obtained from the DX Editor at the address shown at the head of this column. Please send a self-addressed, stamped envelope or a self-addressed envelope and an IRC. All applications should be sent directly to the DX Editor.



G3DO certainly needs no introduction to the DX gang. Doug may be heard on the phone bands almost any time the band is open to Europe. The 813 a.m. rig is in the back. Antenna is a 3 element wide spaced 80 and 40 meters. A G4ZU mini beam is used for 10 and 15 meters.

due to many hams all over the world particularly those in the USA, for having guided me, assisted me and instructed me on the air as well as by supplying material and I, on my part, am trying to help others to put three more stations on the air. Any assistance towards this end will be gratefully received and thankfully applied.

"Recently I have received a large number of QSL cards from West Pakistan QSL bureau. These cards were originally sent to me via this Bureau some of these are as old as July 1961. This should explain the cause of delay in acknowledging all those QSLs which have not been replied so far. I very much regret it and am now busy making out the cards for these unacknowledged QSLs.

"To avoid confusion and delay, I request all QSLs be sent direct to me at the following address: Mohd, AP5CP, Dacca Signals, Dacca —6, East Pakistan."

CR6 Angola: Jo, CR6CA is on 14345 s.s.b. daily looking for "rare" U.S. counties.

CR1Ø Portuguese Timor: Latest info from CR9AH, to PAØWWP has it that a complete station is all ready to go on Timor. This gear was furnished by CR9AH to CR1ØAE who brought it to Timor. CR1ØAE, however, has to attend to official duties first, but before long, it is expected CR1ØAE will be active. CR9AH also mentioned that the CR1ØAB recently active is as phoney as the well-known 3 dollar bill. (*Tnx VERON* DX Press)

FC Corsica: Anyone who has had trouble obtaining a FC QSL should be happy at the following announcement from Waller, DL9PF. "We ride again—this time to Corsica Island, starting July 9th 'til 29th—24 hours on the air, c.w., s.s.b., a.m. 5 bands single ground planes for each band—will have DL5HI with me, he was K9PDH, name of Peter and he's a US service man near Munich. His army duty will be over July 8th, then I pick him up and we start in FC the afternoon of the 9th. Details later."

FW8 Wallis Island: A very enjoyable chat with Bill, VK3AHO, gave us some first hand information of the trip fathered and sponsored by Cal, W4ANE. Bill plans to leave for Noumea on July 21 in preparation for the Wallis trip. There is only one plane per month but Bill says that he is prepared to spend a month there if interest is sufficient. Bill will be using a KWM-2 with DX adapter and Achille, FR8AS, plans on taking a battery operated 60 watt a.m. and c.w. rig. Bill said that he and Cal hadn't got together on frequencies as yet. Either Cal or Bill will get the word out. Bill has received permission to operate from FW8 by the authority there, and will make the trip solo if Achille is unable to free himself for the necessary time. (VK3AOH via WWDXA)

TA Turkey: The contact between Erim, TA2AR and Wil, PAØWWP has been reestablished. PAØWWP also finally received logs and QSL's for the period Sept. 26 to October 2 incl. (PAØWWP is QSL manager for contacts after 26-9-61.) It now is known that Erim had to leave quite suddenly to attend a conference abroad. Erim is a technical engineer with the TA-government with a special task in the scatter propagation field. For this he had to leave quite suddenly. According to Erim TA licenses will become official this month. (*Tnx VERON* DX Press)

TY Dahomey Republic: 5N2RDG is planning to go to TY2 in September or October and will operate on 14 mc c.w. (*Tnx WGDXC*)

VK9 Cocos-Keeling: VK9LA is active from this rare spot. He is crystal controlled on 14017 kc. Look for him about 1430 to 1530 GMT especially weekends. (**Tnx NEDXA**)

VP1 British Honduras: The recent trip by W8NWO, K8LSG, K8OHG, K8NZD, VP1WS, TG9AD and HH2P, who operated VP1WS, netted 4500 QSO with 92 countries. The equipment used was 3 KWM-2s, a 30L-1, a 2 element beam, and 2 all-band dipoles. K8ONV is taking care of the QSL's. (*Tnx WA2NWG*)

VR4 British Solomon Islands: Bob, K6CQM, kindly sent in the following interesting letter from Alan, VR4CV. "Well, at last I am up to date at my end with QSLs and I hope my manager, K6EC, is also the same.

"First, got interested in hamming at Bahrain, Persian Gulf when working for International Aeradio Ltd. and was a temporary op at the company station MP4BBZ in 1956. From then on, I forgot about hamming until my arrival in Honiara and heard VR4JB and VR4CB. Then when VR4JB left for VK-land, on final departure, I acquired some of his rig and started out on July 11th, 1961 as VR4CV. Since then have made a total of 1281 QSOs on 20 and 40, most of them being on 20 meters. Started out on 40 early in February this year and was surprised to hear my sigs being copied in W/K land. My TX is a rock-bound modified RCA AC1-20 putting out about 20 watts on

20 meters and about 25 watts on 40 meters. Skyhooks are 2 dipoles for 20 meters, one beaming NE/SW and the other NW/SE. For 40 meters there is a dipole beaming NNE/SSW. Space and components are pretty rare to get here as there is no radio shop as one sees in bigger places like W/K or VE and importing anything in here takes at least 3 months. In the meantime, the urgent need for a particular item is changed to something more modern.

"Primary interest is c.w. but make rare appearances on a.m. fone. Only change over to fone if the station I am working is hearing me RST 579 or better on c.w. Xtals in my possession at the moment are: 7025, 7030, 7057, 7075 and 7115—these are doubled for the 20 meter band, the first two being used for 40 as well. Also, have a xtal 3520 which I sometimes double on to 40 and have just acquired 3550 xtal from VR4CW, who is now on vacation. Cannot get other xtals unless I pay ridiculous prices for them in VK-land so am kinda tied to the above freqs. Present score is 80 worked. The West Indies, Central Europe, Central Asia, East Africa and the Middle East seem to be in the skip of both my dipoles for 20 meters, but am always hopeful the stations there will pick me up sometime. Hours of operation vary from about 0600 GMT to about 1300 GMT with a couple hours for dinner, etc. in between, and even later on weekends, depending upon conditions. Sometimes open up about 1900 GMT till about 2030 GMT on Tuesdays or Wednesdays on 20 or 40 meters, but have made no significant QSOs during those hours. Can hear quite a few rare ones (for me, at least) but no replies to my calls.

"Any info on how to get transmitting xtals at reasonable rates? Ones needed here are 7005, 7010, 7015, 7020, 7035, 7040, 7045, 7050, 7095, 7100 es others. However, any of these freqs will give me a change of freq.

"VR4CB is on holiday at the moment and will be back on the air shortly. He is only on fone and is never on c.w. VR4CW is on holiday too. He has not renewed his license this year and may be on the bands again toward the end of the year. There is also a possibility of 2 new VR4s opening up, but that depends on the time it takes for their gear to arrive. Nothing definite though.

"I suppose you know that VR1B is about to leave the Gilbert and Ellice Islands and go back to VK-land. Chas, VR4CW and I work for the same government, the Western Pacific High Commission, which consists of VR1-land, VR4-land and YJ1-land.

"Well, Bob, I have mentioned everything that I can think of at the moment. Oh, last but not least, I am a bachelor, hi. As regards your last point in your letter, I try as hard as I can to do my best to keep from blowing my top at the lids on the bands, but lately, have been just dropping hints while QSOing some of the other chaps."

VS4 Sarawak: The following from VS4RM is from K6BWX via the NCDXC; "Am on the low end of 7 mc c.w. every Thursday from 1200-1400 GMT. Ragchewing impossible due to QRM. Short QSOs OK. I will accept QSLs for VS4RS, VSBY and VS4BA."

ZD8 Ascension Island: "I am quite glad that you have written because there seem to be a lot of misconceptions about my gear, times of operating, correct address, etc., and I am more than willing to give you all the info that you asked for.

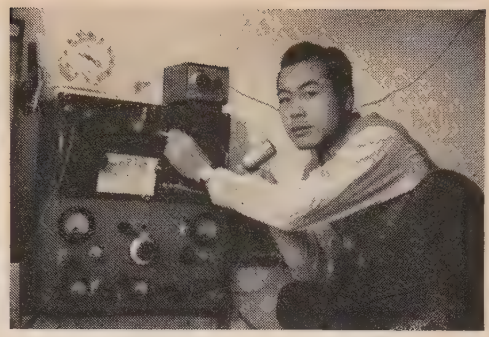
"The apparatus used is a bit primitive and when I see the photos of so and so's station in the various magazines, I wonder if my pile of junk would not perhaps raise a laugh if anyone could see it. I have a somewhat modified B2 transmitter (the type issued to spies of the French Resistance Movement during the war) which puts out about 20 watts on 7 es 14 mc c.w. This is xtal controlled and I often go on 14020 as I say, but I have some other frequencies which I don't use so often and they are useful for arranging skeds to avoid the normal QRM on the spots where people expect to find me. I also have some frequencies in the phone portion of the 14 mc band, and I occasionally go on fone using (don't laugh) the audio amplifier of a phonograph in the next room to modulate the B2 at somewhat reduced power (10 to 15 watts).

"Whilst not exactly what I could wish for, it works after a fashion and I have had several stateside a.m. QSOs. However, I have nothing approaching s.s.b. and have never used this mode, although I have received many cards for alleged QSOs from stations that I have never contacted on any mode, so I think someone is using my callsign. I also get many cards for ZD8LA and other stations that do not exist. ZD8JP is the only licensed station that has existed on the Island since ZD8SC left the Island in 1957 or 1958.

"Antennas consist of various long wires strung up on bamboo poles about 25 feet high. I have also had quite good results using an underground aerial (!) consisting of a piece of insulated wire about a ¼ of a mile long and lying about 3 inches below the surface of the ground. The ground itself is dry volcanic ash with a high percentage of iron in it and this may account for the phenomenon.

"I expect to remain on the Island at least until

This is 16 year old Helge Blucher, LA8OH, of Oslo, Norway. The transmitter is home built and the receiver is an S-40B. Helge is trying for WAS so if you hear him on give him a call.



Two of Japan's up and coming DXers. JA2RW on the left and JA2TH on the right. *(Tnx JA2JW)*

August, 1963. The power normally stays on continuously, but I have operated from the top of the central mountain from time to time, and there the power comes from a small generator supplying a farm which goes off at about 2130 GMT. (It doesn't come on until 1900 GMT either).

"The normal QTH is in Georgetown, a tiny settlement and indeed the only "town" on the Island, with a population of about 900 or less, which lies at the foot of a dormant volcano on the coastline. This is owned (the "town") and run by Cable & Wireless, Ltd. who administer the Island and who are the only permanent residents. They operate a radio station and a relay and regenerator station on the chain of submarine cables spanning the Atlantic. From Georgetown the land rises in a series if barren desolate looking volcano craters and ash comes until in the center of the Island Green Mt. is reached. It is the remains of an ancient crater rising nearly 3000 feet up into the clouds, its summit being green and lush by contrast with the barren slopes below. Here, Cable & Wireless maintain a farm with over a thousand sheep and vegetable gardens, and here, too, the Georgetown water supply is collected in great stone catchment basins designed to catch every drop of rain. Fresh water is permanently rationed here.

The only other people on the Island are the technicians on the tracking and radar station operated by the U. S. and the American population is semi-permanent and varies greatly from month to month with the various missions on hand. For various reasons, they are not allowed to operate as "ham." Most of the place (about 38 sq. miles) is virgin volcanic country, with craters, lava flows, ravines and strange-rock shapes—the haunt of wild donkeys and thousands of sea birds. The golden beaches are used as breeding grounds by the giant Green and Hawksbill turtles. I am beginning to sound like an advertisement so I'll stop. Returning to ham radio, my operating time is limited as; (A) I am studying for an exam (B) I have many other commitments. I can never get on the air before 1700 GMT any day and normally stick to Thursday evenings. I hope that this may be of some interest."

Thanks to W2DGW and the North Eastern DX Association *Bulletin* for the above letter from ZD8JP.

ZL4JF Campbell Island: ZL4JF is again active on 14 mc a.m. He prefers 14275 kc about 0430 GMT. *(Tnx WGDXC)*

WØMLY DXpedition: Dick, WØMLY (ex-HZ1MY, VQ6MY, 4W1MY, 6L6MY etc.) is making a three-month expedition to Africa under the auspices of the *Yasme* foundation. He is now there and hopes to operate from TR8, TL8, TY2 and Togo/5V as well as any other good ones within reach. He has all Hallicrafters equipment.. QSLs via KV4AA and contributions to help defray expenses are requested. QSLing will be same as with *Yasme* expedition. *(Tnx WGDXC)*

Goodies

Here is some down under DX info to VK4SS. Some of it should make your mouth water.

BY1PK can be QSOd around 1000 hours GMT on 14040 kc; QTH is Peking. K6CVQ/KS6 is on 20 meter s.s.b.; QTH is Box 307, Pago Pago. The only other KS6 ham is not active. VK3AHJ/VK9 will show up any time now, on s.s.b., from various parts of New Guinea and Papua. . . . Don't be fooled. ZL4JF is the only active ham on Campbell Island. Don't expect any activity from CR1Ø. Things are too hot around there just now for such activities. . . . KR8AP is on most nights 14 mc c.w. around 1000 hours GMT. The same applies to BV2A, HM4AQ, JT1KAA, VR4CV and sometimes VS4RS. . . . Activity from Cocos Island is represented at the moment by VK9LA, fone and c.w. on 14 mc. . . . There's more than one VK8 active at the moment on 14 mc c.w. and fone, the most important being VK8NL. . . . VKØBB is on around 0945Z. . . . 9M2s can be heard most nights on 7 and 14 mc. 9M2AD being prominent. VK9RH, ZK1AA, ZK1BV, ZK1AR, ZK2AD, VR1G, VU2RA, DU1MR, VR2BZ/VR1, VS9AZE, and VU2US are pretty regular 14 mc fones. . . . On 14 mc s.s.b., most of the following are most frequent around 1000 hours GMT, HS1W, VU2NR, 9K2AM, 9M2DL, KA2JL, HL9KT, VKØDS, BV1US, VS1AU, KA2MM, KA5AS, HM4AQ, XZ2SY, KA2AO. . . . For the 7 mc enthusiasts, the following are heard fairly regularly here: ZS1A, KC6BD, HM4AQ, KR6NW, DU7SV, CR7IZ, CR7CI, CR9AH, 9M2FZ, VU2TN, 5H3HD, ZD6RS, VR1B, ZK2AD and many others. VQ9HB has been on now for many months, regularly on 14 mc c.w. about 1700 hours might be the best time . . . there is now no activity from Chatham Island, Jack, ZL3VB, is QRT. No other ham is at present on the island. . . . If you were lucky enough to work VK5XK/9 who has just left Norfolk Island, have no fears, he is 100% QSL. . . . JZØBM is now QRT. The QSLs go to Bert Modderman, C/ Huize Middendorp, Midden Dorplaan, Wormond, Holland. . . .

7G1A is now at home in OK-land. He says his activity on 3.5 mc c.w. was only for one hour since QRM/QRN were very bad. He was

only station in Guinea so the 7G1B reported recently is a pirate. The new prefixes in Guinea will be 3X (*SM*-DXer).

OK7HZ and OK7ZH are, since the end of December, 1961, in PK-Indonesia, but having very many troubles and inconveniences for the sake of transmitting equipment in the first part of his expedition. They are giving up further DXing and their rig (KWM-1) was sent to Prague (now used by OK1FF). So no more hopes for activity from this expedition (*SM*-DXer).

Nose, KH6IJ, was recently made Assistant Professor of Physics at the University of Hawaii. He is now in Pakistan for the summer. *(Tnx NEDXA)*

The VS9K—gang is planning another trip to a "new one" if they get the ARRL OK. Calls will be VS9S—*(Tnx WGDXC)*

Stan, VS1FZ, need Mississippi to complete WAS. He would appreciate it if some of the boys there look for him.

CERTIFICATES

Libyan Amateur Radio Award

A new and attractive certificate issued on behalf of Radio Amateurs in Libya to applicants submitting proof of contact with eight Libyan Amateur Transmitting Stations.

(a) For stations in Europe, at least three amateur bands must be used;

(b) Stations elsewhere must use at least two amateur bands;

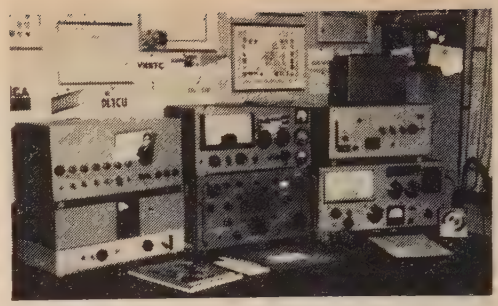
Contacts are valid after 24 December, 1951 (United Kingdom of Libya Independence Day) and awards will be issued for phone and/or c.w., *i.e.* mixed QSOs are accepted. A station may be worked on more than one band.

QSLs must be held by the applicant but need not be sent. However, a check list showing calls, dates, freqs., etc. should be forwarded and countersigned by:

(1) The Secretary of the local Radio Club or Society, or (2) At least three locally licensed amateurs, stating that they have actually seen and checked the QSL cards.

Applications, as above, together with one U. S. dollar or ten IRC should be sent to: The Awards Manager, 5A QSL Bureau, P()B 372, Tripoli, Libya. This charge includes return postage by Second Class Airmail.

This is Club Station YU3CCD with Miki, YU3DO, at the operating position. The transmitter runs 100 watts. *(Tnx WA9AEA)*



This neat and modern station belongs to Willy DL6PI. The transmitter runs 250 watts to an 813 on the h.f. bands and 50 watts on the v.h.f. bands. A three element Tri-Band beam is used.

R6K

Some major changes in Russia's popular R6K (Worked All Continents) award have been announced by the Federation of Radio Sport.

Beginning January 1, 1963, R6K certificates will be awarded only for s.s.b. contacts (the QSOs may date from May 7, 1962). Twelve s.s.b. QSOs will be required—one each with Europe, Asia, Africa, North America, South America and Oceania, and three each with the European and Asiatic parts of the USSR. The R6K award will be available in three classes: First-class for 80-meter contacts. Second-class for 40-meter contacts, and Third-Class for contacts on 20, 15 and 10 meters (any or all of these three bands).

The 12 QSLs should be sent to the Central Radio Club. The present R6K certificate will continue to be awarded until January 1, 1963.

R-100-O

The rules of the R-100-O (Worked 100 oblasts) award have also been changed. It is now necessary to work 100 oblasts in order to qualify for any one of the three classes of the award. The three classes are now as follows:

FIRST-CLASS	100 oblasts on 80 meters
SECOND-CLASS	100 oblasts on 40 meters
THIRD-CLASS	100 oblasts on either 20, 15 or 10 meters or 100 oblasts on various bands, 40 through 10 meters.

These changes became effective May 7, 1962.

My thanks to Ted, K3CUI, for the above translation from *Radio Magazine*.

The 1962 Dayton Hamvention

If this column seems a little more fuzzy than usual, the reason is that we have just recently returned from our annual trek to the Dayton Hamvention. This shindig gets larger and larger every year and the seams of the Dayton Biltmore were virtually bursting this year. The City

Trinidad's international ham barbeque which took place recently in honor of the visit of Nel, G2YL. Back row, l. to r. Walt VP4BO, Ken VP4KR, Host Larry VP4N, Stan VP2SX, Court VP4LH, Ralph VP4LR, and Doc VP4PL. Seated are Keith VP4KE, Club President and ex-GW, Vern VP4VP, Austin YV6BC, John VP4LQ, Nel G2YL, Tek VP4LP, Mac VP4MM, John VP4TO, and XYL, and 4MM's XYL. This largest-ever social gathering of VP4's was made up of 5 different national or territorial representatives including Great Britain, Venezuela, Canada, St. Vincent, Barbados and of course Trinidad. VP4NC mentions that "we are most anxious to extend a warm (!) and cordial welcome to travelling amateurs and suggest visitors to 'The Land of the Humming Bird' contact Vern VP4VP c/o Texaco Trinidad, Ltd., Pointe-a-Pierre; or Larry VP4NC, Chaplain's Residence, Naparima College San Fernando." *(Tnx to VP4L and VP4NC)*

of Dayton has under consideration erecting a municipal convention hall and while it is not officially admitted, the Dayton Hamvention is one of the reasons why this hall will come to pass.

Those of you who have never been to the Hamvention don't know what you are missing. This is particularly true of the DXer. To give you an idea of the quality of DXers who are drawn, there were sixteen 300 country men in attendance. Yours truly was the moderator of the DX forum again this year and between a few risqué jokes and some wonderful speakers,

This neat station belongs to Fred, KØRAL. The final, which is not shown in the picture, is a pair of 250THs. A 3-element beam, which was lost in the windstorm last winter, is again perculating.

everyone managed to stay awake, which was a considerable improvement over last year. I really do not know why they asked me to return again this year, but if they were foolish enough to ask, I would be foolish not to accept. Seriously, I consider it an honor and privilege to have been asked to occupy the speaker's podium for the third consecutive year.

The North Jersey DX Association (of which I am a member) had a suite as usual and contained within the confines of this suite were more DXers than have ever been held in captivity since Marconi pressed out the first CQ. As usual, we played to an overflow audience this year. At one point, things got so bad that we had to get out of the rooms ourselves to make room for all the guests.

Although we had not originally planned it this way, the suite of the NJDXA has traditionally become the gathering place of the DX fraternity at Dayton. Many of the DXers in attendance have told us that the NJDXA suite means just as much to them as the rest of the convention, but, of course, their contributions to the liquid refreshment cause helped to make the event a success. We would particularly like to thank the Ohio Valley Radio Club for their help.

Al, W8DUS, gave a very interesting illustrated talk on his operation along with W9IOP at HV1CN during the c.w. portion of the *CQ*

[*Continued on page 106*]

The USA-CA Program

BY CLIF EVANS*, K6BX

THE most beautiful of all awards, the USA-CA, was unveiled and presented for first time at the Dayton Hamvention, Dayton, Ohio, April 28th, during the main banquet, by Arne Trossman, Editor *CQ* while the OLD MAN looked proudly on.

First to receive the colorful USA-CA award was Lester A. Jeffery, W8WT, from Orchard Lake, Michigan. Next came George R. (Dick) McKercher, WØMLY, from Perry, Iowa. Both W8WT and WØMLY earlier had received their CHC-200 Top Honors awards and Arne Trossman Top Honors Plaques. Our and hamdom's congratulations to two top and well deserving hams. See pictures.

Our congratulations also to ninety-one other USA-CA winners whose awards will be in their hands before you read this. We started processing them on our return from Dayton. We are sure all USA-CA recipients will agree this masterpiece of design and meaningful symbolism is a pride and joy to display as the center attraction on walls of any ham shack. As we said, it is 14 by 21" in size, has all fifty U.S. State flags in full multi-color forming outer borders and with *Old Glory* majestically projected as major theme. Truly a beauty to behold and display. See picture of the USA-CA certificate.

You know, back in 'ancient' times before the advent of USA-CA, we often heard it said to newcomers that one wasn't a full-fledged ham until this or that award was achieved . . . well now, that was 'yesterday.' Today, we'd like to proclaim that if one sought to achieve and display just one award to symbolize cutting his teeth for a place in 'ranks' . . . then the USA-CA will bring with it greater pleasure and deepest satisfaction of them all. We say this because USA-CA is not just an award as such but is a tremendous program within which one may pursue scores of other challenging hobby pleasures . . . fact is, USA-CA is *fun unlimited*.

Because of the Dayton unveiling of USA-CA, we'd like to show you all ninety-one lucky winners for the record:

USA-CA-1000

K4BAI	1	K6YMZ	3	W8NAN	5
K7NHG	2	W5NXF	4	K9EAB	6

USA-CA-500

K2PFC	1-A	SM5WI	1-P	K8EUX	31
W8IBX	1-B	W8WT	1-Q	W3DKT	32
WØMCX	1-C	K9EAB	1-R	K4RNS	33
PJ2AF	1-D	K1BUR	1-S	WØIUB	34
W8NAN	1-E	W1GKJ	1-T	W1YPH	35
ZL1TB	1-F	W5AWT	1-U	W6BJL	36
K6SXA	1-G	W5NXF	1-V	W8RQ	37
K6YMZ	1-H	K5UYF	1-W	W1RWP	38
VE3BKL	1-I	W6YC	1-X	W9GFF	39
W5PSB	1-J	KH6DKA	1-Y	W3BNU	40
KL7MF	1-K	Andy Rugg	1-Z	K7AGJ	41
W4UF	1-L	W6PCA	27	DL1QT	42
TG9AD	1-M	WØARO	28	W9QGR	43
K5DGI	1-N	W2FLD	29	W8APN	44
DL9PF	1-O	W8CXS	30	W9QWM	45
W9CMC	46	K2UKQ	60	KØDEQ	73
KØDEQ	47	KØHUU	61	IT1AGA	74
WA2WKU	48	W5JD	62	WØMLY	75
W8WUT	49	W5EHY	63	W5RIT	76
KP4CC	50	W6UBP	64	W4EEE	77
K9QGR	51	W9CLH	65	W5DQK	78
KØGIC	52	W9YT	66	K1PMY	79
K8GKF	53	W4NOK	67	K5IKL	80
SM5CCE	54	W7NPV	68	VE1AE	81
WA6ATY	55	KØIDV	69	VE3LZ	82
K6BX	56	F9BB	70	W1EIO	83
W7RZY	57	K7CRL	71	WA6AJF	84
W1FPS	58	LU1DAB	72		
W8OQV	59			W1HOY	88

*United States of America Counties Award Custodian, Box 385, Bonita, California.

Endorsements won include: Mixed 65; all c.w. 23; all phone 2; all A3, 4; all s.s.b. 1, (VE3BKL); all 14 mc 3; all 28 mc 1 (LU1DAB); all v.h.f. 1, (W1HOY); all heard, Andy Rugg (s.w.l.).

Arne Trossman Plaques Awarded

The Dayton Hamvention was setting for presentation of three Arne Trossman Top Honors Plaques on April 27th. Proud winners were Lester A. Jeffery, W8WT; George R. McKercher, WØMLY, and Albert H. Hix, W8PQQ.

As you know, the OLD MAN attended the Hamvention. Urb Lejuene, DX Editor for *CQ*, acting as DX Forum Moderator, shared his soap box long enough that we got in a few good plugs for the *Directory, DX-QSL-News Letter*, CHC, FHC and QCWA. If we hadn't heard Urb kicking a chair we'd be up there yet; however, we finally did get around to explaining the why of CHC-200 Top Honors and how the Arne Trossman Top Honors Plaque was born. Arne then made presentations to Les, Dick and Al, following which CHCer Sax, W2SAW, famous both as a DXer and for his DX Stamp Service, gave us a run down on his present six-week tour of Europe where he is giving slide-show talks before many clubs. To make Sax's Europe trip more appreciated, Arne made Sax his official representative to present the Arne Trossman Top Honors Plaque to Harry Akesson, SM5WI, together with USA-CA certificates slated to be delivered in person to SM5WI. SM5CCE, DL9PF and DL1QT. We had several other winners in Europe but Sax's schedule prevented personal deliveries.

QCWA In Action At Dayton

The OLD MAN was much pleased when Ralph Barber, W2ZM, Executive Secretary QCWA, suggested we represent National Headquarters for the 3100 member organization along with the Dayton QCWA Chapter at the Dayton Hamvention. We were pleased also to find that QCWAers were the mainstays of the Hamvention Committee. Pleased muchly, we were to find ourselves seated at the banquet speaker's table between such lovelies as Dorothy Strauber, K2MGE, and the XYL of QCWAer Allan Gunston, W8GQ, who handled Hamvention arrangements. Then, you can just know how we beamed from ear to ear when QCWAer Dan McCoy, W8DG, Toastmaster, gave us that one-two introduction.

Dorothy, along with OM Irv, K2HEA, SSB Editors for *CQ* were s.s.b. Forum Moderators at

Present at the March 22, 1962 meeting of the Dayton Chapter Quarter Century Wireless Association held at the Wishing Well Restaurant in Centerville, Ohio were; front row, l. to r.; W8FJC, W8MZQ, W8DG, W8GQ, W8ENH, K8BYH, W8ACE, W8ORI, W8PQZ, K8HNV; second row: W8EY, W8MON, W8AQT, W8WJW, W8NCV, W8SEL, W8JDV, W8TCO, W8UX, W8LOF, W8DR; third row; W8GE, W8NQU, W8NUX, W8LAX, W8SMQ, W8LEH, W8JXM, W8QO, W8KP, W8FU, W8ALW, W8DPW, W8TSP, W8DMN, W8CXM; back row; W8CIT, W8FYR, W8LCO, W8IPT, W8DWT, W8BBG, W8HPC, W8ZAU, W8OKB, W8PNE, W8MOH, W8IX, (Not Identified), W8DAL, W8CHB.

the Hamvention.

The Dayton QCWA Chapter had an interesting display of OT equipments and displayed a QCWA membership certificate and four colorful QCWA awards of which the OLD MAN is Custodian. Like we have been telling you right along, these Old Goats of QCWA are a live-wire group. With a bit of planned publicity, QCWA has jumped from a somewhat static 2250 members of a year ago to over 3100, and I think Sect'y. Ralph told me rate of growth now was about 3 new members each day. Several new Chapters are being talked up . . . even one here locally in San Diego Area. If you have been pounding brass for twenty five or more years and you aspire to join us old Goats, drop W2ZM a line. If you want a complete list of the Old Goats along with QCWA's awards program rules, drop K6BX an s.a.s.e.

CQ paid tribute to all QCWAers and QCWA leadership by multiple picturing of QCWA's insignia identification stamps comprising the cover for May issue, and this issue was well in evidence at the Dayton Hamvention.

Dayton Hamvention

Been pounding brass about forty-four years and just got around to attending our first Dayton Hamvention. Had fun, yes, but sure didn't get any sleep for two days. Got a whale of a kick out of meeting hundreds of folks we'd had chin fests with over the years, especially so many of the *big* DXers who have been jockeying on the Totem Pole these many years. Don't kid yourself, those boys just live and breath DX and don't attempt to change the subject.

To those of you who haven't attended one of these Dayton shindigs, do take one in because it's a real show . . . like several carnivals running simultaneously, and take your pick of the 'shows.' You'll find all the manufacturers displaying and hawking their wares. Then for real togetherness-eye-ball QSOs you'll find scores of open houses. These are rooms set aside for this or that club or organization. We were smart; collared Urb, W2DEC, first off and asked him which was the DXer 'key' headquarters. No doubt about it, that North Jersey DX Association was there in full force and if you frequented their 'room' you met more DXers and would-be DXers than anywhere else . . . fact is, don't think some of them left 'headquarters' during the whole Hamvention . . . at least when we checked out at 5 A.M. each morning they were still 'working countries,' and even creating new ones. After Dayton the quiet in Bonita is deafening!

Next Dayton Hamvention is slated for 26-27 April 1963. Jot it down on your calendar. The Dayton 'bug' bit me so guess we're hooked from now on!

Iowa to Join USA-CA Program

As we go to press, received a nice letter from Loren Toomsen, KØRUF, editor of *Mismatch Magazine*, in which he says he's sure he's speaking for all 4000 Iowa hams that they'd like to put the good state of Iowa on the USA-CA map with a county award. Loren said, just announce the award is on the way and you can be sure enough fellows are interested to produce an award that hamdom will want to work for. So, stand by for more awards news from Iowa.

County Mobiling Cross Country

When Cliff Corne, K9EAB, submitted his application for USA-CA-1000 he let me in on a little secret how he's been piling up many new and some rare counties. Just don't think Cliff should have an exclusive on all this fun and as he didn't Copyright the idea, we'll slip his secret along to you . . . quoting Cliff; "Your USA-CA Program is affecting everybody! Last Fall, K9MMA and K9MFH travelled 2000 miles in 3 days through Wisconsin and by staying close on their trail they confirmed 41 counties for K9EAB . . . This Easter vacation period developed a 'C-expedition' to Missouri where 1600 miles in 3 days qualified 42 new counties, all c.w. for K9EAB. On the last sortie, K6SXA/Ø, Jim Herndon, attending collegt at Grin-

nell, Ia., joined in and picked up 32 Missouri counties."

Cliff said such trips were unannounced as they were spur of the moment C-expedition decisions for express purpose of visiting as many counties as possible in the shortest period of time. Cliff says next in mind is a C-expedition for a crack at Kentucky with a few rare ones from Indiana enroute.

From what Cliff said, we aren't just sure who has most fun, those on mobiling C-expeditions or home base stations! Cliff winds up by saying; "Just think of the gasoline, meals, lodging and other purchases . . . all good business for merchants . . . and all extra because a wild man out in California has bugged us with this new C-hunting sport."

Cliff gives me a 'crazy-or is it' idea . . . why not someone take a Greyhound Bus trip cross country, East to West Coast or vice versa, giving county contacts all the way? Maybe Greyhound would cooperate with special accommodations? Just a 'bug.'

Unusual 'Things' Make News

'Tis a fact, unusual happenings make news. Sometimes such events are just one-shot deals; however, many times they are the start of far-reaching csonsequences and further developments . . . like now say the OLD MAN was to come up with story and schedule of say half a dozen Sky Divers maneuvering in formation and, equipped with ham radio sets, giving out contacts . . . gosh, what would we call it? *Sky Diving Aeronautical mobile?* But then when they open their parachutes, what then? Parachute Aeronautical mobile? Okay, you've been bugged . . . it's in the mill and any day now you'll have an opportunity to work these two new categories of mobiles. Interested? Like the man said, the Flying Hams' Club will generate much news in the future.

While we are on the subject of FHC, now over 500 members worldwide, maybe you'd like to know that FHC Squadrons are being formed all over the world . . . takes six FHCers to form a Squadron and three squadrons to form a Wing One Wing is forming now. Besides having fun and creating high interest news, FHC's goal is to become the *biggest* Air Force in the World.

New Worked U.S. Colleges Award

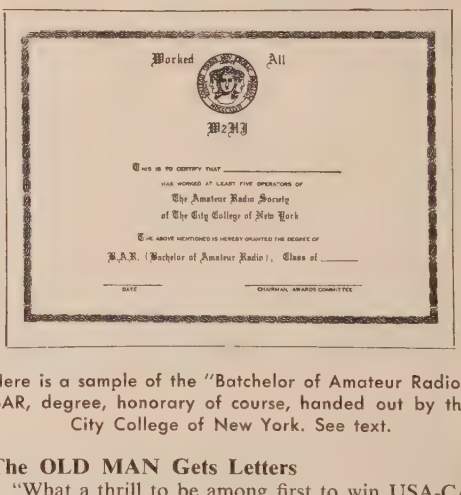
The Villanova University Amateur Radio Club, Villanova, Penna., sponsors an award for working any five college or university radio club stations and the Villanova station W3YP. To get the award send QSLs or certified list with 50¢ or 4 IRC's to W3YP, c/o CWA, Box 171, Villanova University, Villanova, Pa.

To show the interest our educational institutions at the college and university level have in amateur radio, our survey came up with 190 such club stations as follows:
*W1*AF, ASZ, DKG, DWN, BT, HDA, HGS, HLO, HRK, JRA, LXV, MX, PTC, VPY, YA, YK, YU, ZUG; *K1*GPN, IGL, LJW, LMM, WAH; *W2*AEE, CLY, CXM, DSC, EZE, GSB, GTF, GXT, HJ, NSG; *K2*HEK, RXM, UIA, VWH; *W3*ABT, AEQ, EAX, GQF, MGF, NKI, RDK, SUS, YA; *K3*KJI, KKH. *W4*AHI, AQL, ATC, DFU, JP, PKD, PYM, WE, WEJ, YGN, YGP, ZXN; *K4*DKI, FBU, FBY, GEO, PDM, VIW, WDZ; *W5*AC, DDR, IWO, GB, LJY, MSB, MUB, PXZ, YD, YE, YF, YG, YM, YU, YUZ, YW, ZEA; *K5*DVK, ISK, JEF, NBD, PXZ, RHQ, UAS, WAT, WCO; *W6*BHZ, FDI, HRM, PLW, NBV, SNV, YF, YL, YR, YRA, YU, YX; *K6*HKF, SKC, SKD, ZZQ; *WA6*ACR, LYL; *W7*IVM, MHS, PAL, PQA, ROX, TJV, TMK, UO, YD, YK; *K7*NBL, NGF, OHR, WBB, WBE; *W8*KTV, LT, PME, PZS, SH, YY; *K8*GRA, GRE, ORW, WBL; *W9*BGX, DAY, GOC, HEH, HHX, JWC, NAA, OBV, ODD, OWW, SAL, UIH, YH, YOL, YT, ZOW, ZXR; *K9*BJF, CLV, WBV; *WØ*AHW, ANA, ASR, BXY, EEE, ENA, FLN, FVT, FX, HS, IO, JI, MJL, NAA, OEZ, IGJ, QEV, QON QQQ, UTI, WAD, WQQ, YC, YI, YO, YQ, ZLN; *KØ*DSD, MIA, MIC, NBR, NBX, NRG, NRM, SIO.

NOTE: Will appreciate notification of any additional college and/or university amateur radio club stations.

Get a College Degree Real Fast Like

The Amateur Radio Society of the City College of New York, W2HJ, offers an attractive "Bachelor of Amateur Radio," BAR, 'degree' to any radio amateur working five members of the Society. Shouldn't be too hard as the college boasts more hams in attendance than any other college in the world. A check of their list for both students and teachers at C.C.N.Y. shows a whopping eighty hams on tap at present time. For current list and further inquiry or applications, send to Amateur Radio Society of the City College of N.Y., W2HJ, 139 Street and Convent Ave., New York 31, New York. See picture of the "degree" certifiicate issued.


Worked All

W2HJ

THIS IS TO CERTIFY THAT _____

HAS WORKED AT LEAST FIVE OPERATORS OF

The Amateur Radio Society

of The City College of New York

THE ABOVE MENTIONED IS HEREBY GRANTED THE DEGREE OF

B.A.R. (Bachelor of Amateur Radio), Class of _____

_____ DATE

_____ CHAIRMAN, AWARDS COMMITTEE

Here is a sample of the "Batchelor of Amateur Radio" BAR, degree, honorary of course, handed out by the City College of New York. See text.

The OLD MAN Gets Letters

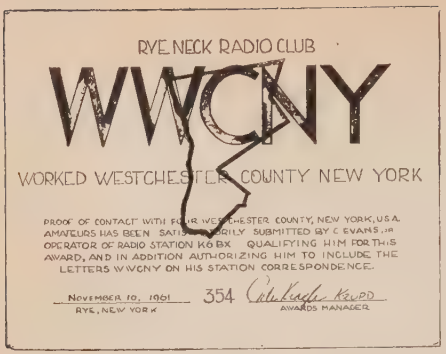
"What a thrill to be among first to win USA-CA . . . sure enjoy your articles and hope that big 'boss' man in New York keeps you writing for ever. This county 'biz' is really fun and I get a thrill each time I shade in a new county in the *Record Book*. Am learning more about these great 50 U.S. states than I did back in school days. Everyone I talk to appreciates what the OLD MAN is doing for us . . . 73/88, Avis, W8WUT."

"You have certainly made hamming a much more enjoyable pastime, and have given purpose to the

→

At long last, here it is! The biggest and most attractive award in all amateur radio! The new USA-CA certificate measuring 14 × 21", bordered by the state flags of each of the 50 states in full color is now being distributed to all winners.

UNITED STATES
OF
AMERICA
COUNTY AWARD
BY
THE RADIO AMATEUR'S JOURNAL
CQ
Be it known to all those present, that on this day
has provided satisfactory evidence in communicating with five-hundred or more different counties of the United States of America, with special Band/Mode endorsements affixed hereto.
Endorsements
Certificate no.
Date
USA-CA Custodian
2500 COUNTIES
2000 COUNTIES
1000 COUNTIES
1500 COUNTIES
3000 COUNTIES



Pictured here is the Worked Westchester County award sponsored by the Rye Neck Radio Club, N.Y., W/K/VE stations work four stations in Westchester County and DXers work only 2. Send certified list and 50¢ to K2UPD, 115 Wapanoca Ave., Rye, New York.

many contacts which, however enjoyable they may have been in themselves, often left the thought in the past that it was just another QSO among hundreds . . . I'm going to look you up when I come to the states in December. 73, Norm, VK4TY"

"Sure enjoy your honest and realistic approach to Amateur Radio, for you have put new meaning and enjoyment in being a ham. It is amazing what a bit of honesty can do to any large group. Continued success and believe me when I say all real amateurs are behind you 100%, Bob, W6MDK"

"I'm looking forward to displaying my USA-CA. Good to see more of your *Directories* here in Springfield (Mo.); stops some of the midnight callers who are tearing their card files apart looking for required confirmations for various awards. Do keep up the dope in *CQ* as it is good reading for us certificate hunters here in the Ozarks. 73, Don, KØHUU"

"Saw your offer of free poop sheets in April *CQ*. . . . good gosh, send me those poop sheets so I can get in the 'swim.' Also, put me down for the USA-CA Good-Will Club. 73, Bob, K2YFE"

"I'd be more than happy to help DXers identify U.S. counties . . . keep up the good work and God bless Archibald's most famous son. 73/88, Sue, K5SBN"

"FB on helping our DX friends identify U.S. counties . . . count these two Montanians in . . . 73, Harry and Bertha, W7RZY/K7CHA"

"Enjoy your *CQ* column and wish others were as well written and interesting. Keep up the good work . . . 73, Clarke, W4PAQ"

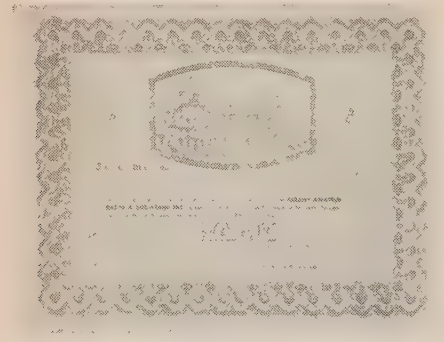
"USA-CA is most fascinating. Enjoy your column very much . . . Oscar, K8CIR"

"Add me to the many s.w.l.s who follow your highly interesting presentations of awards. Will become a ham soon as we've gotten the 'bug' after thirty years in the construction game . . . Steve, s.w.l."

"More than willing to help DXers identify counties. Plan to operate from many 'rare' N.Y. counties this summer and be in Schuyler during N.Y. QSO Party. The USA-CA offers many exciting adventures. Thanks, Frank, WA2KQG"

The above are but random samples of hundreds of letters received in connection with the USA-CA Program and the OLD MAN's many projects . . . think we'll bundle 'em up and send them along to that bloke 'boss' in New York along with a 'demand' for a raise!

This is the Worked Cape Cod & Islands Cetificate sponsoed by the Cape Cod and Islands Radio Association, Inc., for working members. Stations outside continental U.S., work 3 members, one from each county of Dukes (Island of Martha's Vinyard), Nantucket (Island of Nantucket), and Barnstable (Cape Cod). Others work 10 members with all three counties represented. Send full log data to W1AKN, Box 107, Sandwitch, Massachusetts.



Pictured above is the Worked Albany Radio Members award (WARM) sponsored by the Albany New York Radio Association. Stations within 50 miles of Albany work 25 members; others only 10. No charge. Send full data contacts to club, 17 Cleveland St., Albany, New York.

USA-CA DX Good-Will Club

Reports still flow in from DXers lamenting that many hams show inconsideration by failure to identify counties on their QSL cards. To offset this complaint and help our DX friends, the USA-CA DX Good-Will Club was created with membership open to all U.S. hams and s.w.l.s willing to assist DXers identify U.S. counties on a person-to-person basis. If you are willing to help, send us a postcard. We plan to list members each quarter, and DXers may feel free to write any member listed for county identity help. Today's fifty-six members include: *W1*EIO, GKJ, LXF. *K1*MBM, MEM, QCJ; *W2*EMW, JQU, KAT; *WA2*KQG, TCW; *W3*OUA. *W4*UF, VWW; *K4*JIG, VRI. *WA4*BMC; *W5*AWT, VSQ, VZU; *K5*SBN, USE; *W6*MDK, OJW, YC; *K6*BX, JBP; *WA6*DWH, OZL, PDE; *W7*NNE. *K7*CHA, NHV; *W8*CSK. *K8*IQB, IUZ; *W9*CLH, GFF, QQG, UX; *K9*DWG, QGR, TZH; *WØ*ITO, PLN, VBQ; *KØ*BQI, DEQ, RGU; *WAØ*AQN; S.w.l.er, Bob Savoy, 7801 Hashbook St., Phila. 11, Pa.

[*Continued on page 110*]

PROPAGATION

George Jacobs, W3ASK
11307 Clara St., Silver Spring, Md.

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during July, 1962. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Charts are most likely to open with "good" quality (B) when conditions are above normal (July 4-6, 21-22, 28-29), and with "fair to poor" quality (C-D) on days when conditions are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be "disturbed," etc.

PROPAGATION CONDITIONS and CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days* July 4-6, 21-22, 28-29	*Normal Days* July 1-3, 7, 10-12, 17-20, 23-27 30-31	*Below Normal* July 8-9, 13	*Disturbed Days* July 14-16
(1)	C	D-E	E	E
(2)	B	C-D	D	E
(3)	A	B-C	C-D	D-E
(4)	A	A-B	C	D

Where:

A—Excellent opening with strong steady signals.
B—Good opening, moderately strong signals, with some fading and noise.
C—Fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.
D—Poor opening, signals generally weak, with considerable fading and high noise level.
E—Very poor opening, or none at all.

With long hours of daylight and the sun high in the northern sky, ionospheric conditions during July are generally more stable than during any other month of the year.

Twenty meters is expected to be the optimum band for long-distance propagation during July. Peak conditions on 20 are forecast for several hours after sunrise, and during the late afternoon and early evening hours. Quite frequently, the band is expected to remain open around-the-clock to one area of the world or another. Fifteen meters is forecast to open fairly frequently on north-south paths, especially during the late afternoon hours. Few openings are expected to other areas of the world. Very few 10 meter DX openings are predicted for July, as a result of seasonally low ionization and the low level of sunspot activity.

During the hours of darkness, 40 meters is expected to open to several areas of the world, but seasonally high static levels may often make DX reception difficult. High static levels are also expected to result in somewhat poorer DX conditions on 80 and 160 meters, although some DX openings are forecast for both bands during the hours of darkness.

Short-Skip

This month's column contains Short-Skip Propagation Charts for July and August. Short-skip conditions are expected to be optimum during July, mainly as a result of the peak in occurrence of sporadic-*E* propagation. During the hours of daylight, considerable short-skip openings are forecast for 10 and 15 meters over distances ranging between approximately 500 and 1300 miles. Frequent short-skip openings on 20 meters, ranging between 300 and 2300 miles, are expected almost around-the-clock, with conditions peaking during the late morning hours and again during the late afternoon and early evening hours.

Good daytime short-skip openings on 40 meters are predicted for distances between approximately 100 and 750 miles, with good nighttime openings between 250 and 2300 miles. Good 80 meter short-skip openings are expected during the daylight hours for distances up to approximately 300 miles, and up to 2300 miles during the hours of darkness. While no 160 meter short-skip openings are forecast during the daylight hours, some openings are expected to occur over distances up to approximately 2300 miles during the hours of darkness.

V.H.F. Ionospheric Openings

Intense sporadic-*E* ionization expected during July is likely to result in some 6-meter short-

skip openings between distances of approximately 900 and 1300 miles. There is also the possibility that an occasional short-skip opening over a distance of approximately 1200 miles may also occur on 2 meters as a result of sporadic-*E* propagation. See "Notes On Sporadic-*E* Propagation," appearing in last month's *CQ* for additional information about sporadic-*E* propagation, and methods for predicting short-skip band openings on 10 and 6 meters.

Some meteor-type v.h.f. ionospheric openings are likely to occur during the last week of July when the *Perseids* and *Aquarids* meteor showers are in progress. The *Perseids*, one of the major meteor showers, usually extends well into August.

At least one major auroral disturbance usually occurs during July. V.h.f. short-skip openings resulting from auroral ionization are often possible during such dsturbances. Refer to the "Last Minute Forecast" appearing at the beginning of this column, for periods that are expected to be disturbed during July.

[*Continued on next page*]

CQ SHORT-SKIP PROPAGATION CHART

July & August, 1962

Band Openings Given in Local Standard Time

AT PATH MID-POINT (24-Hour Time)

Band (Meters)	*50-250 Miles*	*250-750 Miles*	*750-1300 Miles*	*1300-2300 Miles*
10	*Nil*	07-09 (0-1) 09-13 (0-3) 13-17 (0-1) 17-21 (0-2) 21-23 (0-1)	07-09 (1) 09-13 (3) 13-17 (1-2) 17-21 (2-3) 21-07 (1)	07-09 (1-0) 09-13 (3-0) 13-17 (2-0) 17-21 (3-0) 21-07 (1-0)
15	*Nil*	07-09 (0-2) 09-13 (0-3) 13-21 (0-2) 21-07 (0-1)	07-09 (2) 09-13 (3) 13-17 (2) 17-19 (2-3) 19-21 (2) 21-23 (1-2) 23-07 (1)	07-09 (2-0) 09-13 (3-0) 13-17 (2-0) 17-19 (3-1) 19-21 (2-1) 21-23 (2-0) 23-07 (1-0)
20	*Nil*	06-09 (0-2) 09-15 (0-4) 15-20 (0-3) 20-24 (0-2) 24-06 (0-1)	06-09 (2) 09-15 (4) 15-18 (3) 18-20 (3-4) 20-24 (2-3) 24-06 (1-2)	06-09 (2) 09-15 (4-2) 15-16 (3) 16-18 (3-4) 18-20 (4) 20-22 (3) 22-24 (3-1) 24-04 (2-0 04-06 (2-1)
40	07-09 (1-2) 09-15 (1-4) 15-19 (2-4) 19-23 (1-2) 23-07 (0-1)	07-09 (2) 09-11 (4-2) 11-15 (4-1) 15-17 (4-3) 17-19 (4) 19-23 (2-4) 23-07 (1-3)	07-09 (2-1) 09-11 (2-0) 11-15 (1-0) 15-17 (3-1) 17-20 (4-3) 20-23 (4) 23-05 (3-4) 05-07 (3)	07-09 (1-0) 09-15 (0) 15-17 (1-0) 17-20 (3-2) 20-05 (4) 05-07 (3-1)
80	06-09 (3-4) 09-17 (4-3) 17-21 (4) 21-04 (3-4) 04-06 (3)	07-09 (4-1) 09-17 (3-0) 17-19 (4-0) 19-21 (4-2) 21-23 (4-3) 23-04 (4) 04-06 (3) 06-07 (4-2)	07-09 (1-0) 09-19 (0) 19-21 (2-1) 21-23 (3) 23-04 (4) 04-06 (3) 06-07 (2-1)	07-19 (0) 19-21 (1) 21-23 (3) 23-03 (4-3) 03-04 (4-2) 04-05 (3-1) 05-06 (3-0) 06-07 (1-0)
160	17-18 (1-0) 18-19 (1) 19-21 (3-1) 21-23 (4-2) 23-05 (4-3) 05-07 (3-2) 07-09 (1-0)	18-20 (1-0) 20-21 (1) 21-22 (2-1) 22-23 (2) 23-05 (3-2) 05-07 (2-0)	20-22 (1) 22-24 (2-1) 24-02 (2) 02-05 (2-1)	20-22 (1-0 22-24 (1) 24-02 (2-1) 02-05 (1-0)

HAWAII TO:

*Openings Given in Hawaiian Standard Time**

	15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Eastern USA	11-14 (1) 14-16 (2) 16-18 (1)	02-05 (1) 05-07 (2) 07-14(1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	18-20 (1) 20-24 (2) 24-03 (1)	20-21 (1) 21-23 (2) 23-01 (1) 22-24 (1)†
Central USA	08-12 (1) 12-16 (2) 16-19 (1)	04-05 (1) 05-07 (3) 07-09 (2) 09-13 (1) 13-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	18-20 (1) 20-02 (3) 02-04 (2) 04-05 (1)	20-22 (1) 22-02 (2) 02-03 (1) 21-02 (1)†
Western USA	08-11 (1) 11-14 (2) 14-16 (1) 16-18 (2) 18-19 (1)	04-05 (1) 05-08 (2) 08-11 (3) 11-15 (2) 15-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	18-19 (1) 19-20 (2) 20-02 (4) 02-05 (3) 05-06 (2) 06-07 (1)	19-21 (1) 21-23 (2) 23-03 (3) 03-04 (2) 04-05 (1) 23-03 (1)†

ALASKA TO:

Openings given in Alaskan Standard Time‡

	15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Eastern USA	*Nil*	13-16 (1) 16-18 (2) 18-20 (1)	22-01 (1)	*Nil*
Central USA	17-19 (1)	14-16 (1) 16-18 (2) 18-20 (1)	23-03 (1)	*Nil*
Western USA	17-20 (1)	09-16 (1) 16-20 (2) 20-22 (1)	23-01 (1) 01-04 (2) 04-06 (1)	01-04 (1)

Forecast Ratings

The numerical ratings appearing in parenthesis following each predicted time of opening indicate the *total* number of days during each month of the forecast period that the opening is expected to occur, as folliws:

(1) Less than 7 days
(2) Between 8 and 13 days
(3) Between 14 and 22 days
(4) More than 22 days

On the Short-Skip Propagation Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the longer distance.

For the *specific* days of each month on which a particular opening is most likely to occur, as well as a day-to-day forecast of reception conditions (signal quality, noise and fading levels), see the "Last Minute Forecast" which appears at the beginning of this column.

All times are shown in Local Standard Time, using the 24-hour system. Midnight is shown as 24, while 01 is 1 A.M., etc. Noontime is shown by 12, while 13 is 1 P.M., 14 is 2 P.M., etc.

The *CQ* Short-Skip PROPAGATION Charts are based upon a c.w. effective radiated power of 75 watts from a half-wave dipole antenna, a half-wave or higher above ground. The Charts are valid through August 31, 1962. These forecasts are based upon basic propagation data published monthly by the Central Radii Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

*Hawaiian Standard Time is 5 hours *behind* EST; 4 hours *behind* CST; 3 hours *behind* MST; 2 hours *behind* PST.

†Possible 160 meter openings.

‡Alaskan Standard Time is 4 hours *behind* EST; 3 hours *behind* CST; 2 hours *behind* MST; 1 hour *behind* PST. *Add* 9 hours to the times given in Chart to convert to GMT.

The New Look

This month's Short-Skip Propagation Chart and special Charts centered on Alaska and Hawaii, are presented in a new, clearer and easier to read form. The Charts are now set in type, replacing the photographing process used for the past 11 years. Since it is difficult and expensive to mix numbers and letters in type-setting tabular data, times of openings appearing in the Charts are now given in the 24-hour time system rather than the more familiar A.M. and P.M. system used previously. Don't let this change confuse you, 24-hour time is simple to use. The first 12 hours in the 24-hour system are the same as in the A.M. system; 01 is 1 A.M., 02 is 2 A.M., etc., until 11 for 11 A.M. The figure 12 is used for noon, 13 for 1 P.M., 14 for 2 P.M., etc., until 23 for 11 P.M. The figure 24 is used for midnight. The 24-hour time system can be converted easily to equivalent P.M. times by simply substracting 12 from any number *greater than 12* in the 24-hour system. For example, if an opening appears in the Charts for 14-20, this means 2 P.M. to 8 P.M., Local Standard Time.

Give it a try, it isn't as confusing as it may seem at first glance, and this change permits the Charts to be presented in a more readable form than previously. Let's have your comments please.

Sunspot Cycle

The sunspot cycle continues to decline slowly. The monthly Zurich sunspot number reported for March 1962 was 46. This results in a smoothed sunspot number of 51 centered on October 1961. A smoothed sunspot number of 34 is forecast for July 1962. An up-dated graph depicting progress of the present sunspot cycle (cycle 19) since its beginning in 1954, as well as the latest forecast for the remainder of the cycle, will appear in next month's column.

H.F. Propagation & Nuclear Explosions

In an effort to determine the effects of nuclear explosions on high frequency radio communications, the Atomic Energy Commission announced recently that the United States plans to set off three high-altitude nuclear shots during June or July. The shots, part of the present U.S. test series, will be detonated over Johnston Island in the Pacific Ocean, approximately 700 miles west of Hawaii.

According to the AEC, plans call for detonating a nuclear device of approximately one megaton force, and two other smaller devices at altitudes ranging from 40 to several hundred miles. Since these explosions will be taking place in the ionospheric region of the earth's atmosphere, the resulting effects are expected to "black-out" high frequency radio communications crossing large areas of the Pacific Ocean surrounding the point of detonation. The "black-out" effects are expected to be noticeable for at least several hours on most trans-Pacific radio circuits between 3 and 30 megacycles.

During the summer of 1958, the United States conducted similar high-altitude tests in the South Atlantic. Called Project Argus, these nuclear blasts injected electronic radiation into the earth's upper atmosphere at a reported level of approximately 300 miles. The initial burst of electrons, trapped by the ever-present magnetic field surrounding the earth, was carried along the lines of magnetic force in such a manner as to create within an hour's time, a shell, or "skin" of radiation almost completely girdling the earth at high altitude. Elaborate preparations were made to observe the effects of the Argus firings from the ground, from airplanes and rockets, and from the Explorer IV satellite.

The effects of the Argus explosion were readily observable by recorded changes in the earth's magnetic field and in radio soundings of the ionosphere. Bright auroral glows appeared overhead at the point of firing, and were also reported at the other end of the magnetic lines, near the Azore Islands in the North Atlantic, and near Samoa, in the South Pacific. High frequency radio circuits traversing the ionosphere for large distances surrounding the point of detonation were "blacked-out" for at least several hours, and some of the geophysical effects produced by the Argus experiment persisted for several days.

The present series of high-altitude tests have been developed from the 1958 Argus experiment, and subsequent theoretical studies. The 1962 tests will be one of the most heavily instrumented scientific experimetns ever to be conducted. An army of scientists, engineers and technicians will be manning a large assortment of scientific instruments throughout the Pacific area and in other parts of the world, in an effort to determine as completely as possible, the geophysical and radio effects of high-altitude nuclear explosions.

Radio Amateur Participation

The AEC has reported that it will release the date of each high-altitude shot of the 1962 series a few days before detonation takes place in order that scientists throughout the world may make independent measurements of the effects. The Federal Communications Commission plans to make high frequency radio observations at its monitoring stations in the Pacific area, and has requested radio amateurs to report instances of unusual reception during the period of the experiments. Reports of unusual reception conditions observed on the various high frequency amateur bands, especially on trans-Pacific circuits, during or after the nuclear detonations, can be sent directly to the Editor of this column for forwarding to the FCC. Reports should contain the time the observation was made, the circuit, and as full a description as possible of the propagation effect noted.

73, George, W3ASK

ham clinic

CHARLES J. SCHAUERS, W4VZO
c/o CQ, 300 WEST 43rd ST.,
NEW YORK 36, N. Y.

EVIDENT from the correspondence received by HAM CLINIC is an ursurge in ham radio equipment construction. Contrary to what many hams think, the saga of the ham workshop has not reached its final chapter, nor will it for a very long time to come!

There is much more satisfaction in designing and constructing a piece of ham gear than in purchasing the ready-made article, because the constructor is intimately acquainted with every component and circuit in his set. To him troubleshooting is a breeze and he does not have to depend upon factory technicians for advice and assistance to put his set back into operation after it develops trouble.

The largest excuse for not constructing one's own equipment is the lack of time. As one businessman-ham said to me recently, "I like to operate. If I spend hours putting a rig together, I would have little time for operating, so I purchased all commercial equipment."

A friend of mine who has been a ham since 1930 told me that the reason he quit making his own station equipment was that he felt incapable of turning out equipment that is as efficient as the commercial package.

"The reason I stopped designing and constructing my own equipment," a veteran technical writer told me, "is that I feel when I purchase a commercially made receiver or transmitter for example, that I am not only buying the equipment, but also the many hours of research, testing and assembly that went into it." We believe he has a very good point.

"Constructing my own equipment enables me to save a lot of money," one reader wrote, "and I believe that the ham who builds a part or all of his station gear is really enjoying the hobby.

"Other than the station receiver, which is the most difficult to put together, I feel that all young hams should start out by building their own equipment. If they don't, they are missing a great deal of fun, and of course the technical education that goes along with it.

"I would venture to say that over 50% of the radio amateurs who have never constructed their own equipment do *not* know really when their commercial sets are operating at maximum efficiency. Yes, they can read the meters, but they are depending on the instruction book and not personal know-how.

"I realize that there are many schools of thought on the pro and con of home-made vs. commercial equipment, but one fact stands out very vividly—the ham who 'rolls his own' is usually better technically qualified than the one who buys all of his equipment and he enjoys the hobby of ham radio much more."

There is little doubt about the last statement, for the ham who does more than just operate derives more satisfaction than he who has never used a soldering iron.

Packaging Info

"I am sure there must be an easy and orderly way to determine packaging requirements for a piece of radio-electronic gear. What I mean is, there must be a practical approach at arriving at a *best* way to lay out a piece of equipment one has designed. As I do it now (and as no doubt many others do it), after obtaining the parts, it's a 'cut and try' deal all the way through. Surely there must be a better way. What can you say on this subject?"

Well, I can tell you how *I* do it. Perhaps some of our engineer-ham readers concerned with radio-electronic packaging can throw more light on the subject. If so, we'd like to hear from them.

After designing a unit on paper, I usually *breadboard* all of the components involved so that I will have the *shortest* leads between them. I do consider shielding, unwanted feedback, overall distributed circuit capacity and inductance (in r.f. circuits) and so on. Wherever I can, I use clip leads instead of soldering.

When the piece of equipment is operating to my satisfaction, I then check for heat radiation and optimum component positioning. I try wherever possible to group components as they must be grouped in or on top of a chassis that I must now choose.

The choice of a chassis is not difficult—to me anyway. I go about it in this way: first I disassemble the breadboard carefully stage by stage (or section by section). I carefully place all the parts from each stage or section together on my workbench. For example, I place the power transformer, choke, filter condensers, bleeder resistors and so on together. I then estimate the distance I want the heat producing parts from temperature sensitive components. This distance may determine the length or width of my chassis after I have considered the number of parts which make up the unit.

I then determine what parts will be mounted below and above chassis and check the size of the largest part that will go in and on top of the chassis. I provide for at least ½" clearance underneath and do not worry too much

about the parts mounted above.

If a panel is used I then calculate panel height by measuring the tallest part to be mounted on the chassis top. I allow up to 1½" or more clearance.

Using a piece of stiff white cardboard cut to an available chassis size, I then lay out all top mounted parts in actual size. I do the same for the parts to be mounted under the chassis. At this point I lay out my panel and try to "human engineer" it for best control appearance (symmetry) and operational ease.

If a chassis, panel and cabinet are available as a complete package in the dimensions I require, I of course take the package. But this is not always possible, so I may be forced to do some metal work trimming down a larger package.

Using my stiff cardboard outlines as templates I proceed to mark part position, holes, *etc.*, using a grease pencil. After this operation I cut socket and screw mounting holes.

Assembly starts off by mounting the largest and heaviest parts first (unless this is precluded because other parts must be mounted due to mechanical considerations before the heavier parts).

Tube or transistor sockets are then mounted as are all other parts which must be fastened to the top or bottom of the chassis.

Because I always use colored wire, I can leave my work for any length of time and go back to it and not have to spend a lot of time searching for my last connection.

I use black for grounds, red for plate and high voltage circuits, yellow for grid circuits, white for cathode circuits, green for screen and suppressor circuits, brown for filament circuits, purple for r.f. circuits, orange for all a.f. connections, blue for meters and gray for other circuits. To aid me in troubleshooting, the colors are marked on my wiring diagram. Wherever I can, I avoid running similarly colored wires in a cable harness.

Some of the things you should be very *careful* about when putting equipment together are: keep a.f., r.f. and a.c. power leads separated. Do *not* use JAN tube shields if you can obtain the IERC heat dissipating shields—they are worth the dollar they cost. Make certain that your r.f. shielding is effective. Do your painting *before* parts mounting—it is easier. Do not mount relays close to multi-element tubes—too much vibration. If you can avoid it, never solder transistor leads—use sockets. When space is available, increase the ratings of resistors used in power circuits—cuts down the heat. If you want to solder aluminum use the new *Tin-A-Lum* a product of Production Metals, Inc., 299 Pavonia Ave., Jersey City 2, N.J. This solder is terrific, for it is nearly impossible to make a cold joint with it, the cause of many headaches in set construction.

A little planning when considering the electrical and mechanical aspects of ham radio construction will save many hours of work.

Observation

Many *CQ* readers are electronic-radio engineers and at the same time very enthusiastic hams. A letter recently received from one of them said this: "I enjoy the HAM CLINIC column very much and often wonder how you can compile such an interesting column month after month, year after year. Being a professional radio engineer I can appreciate the job you are doing. If you would only include some *high level* technical 'tid-bits' and information for those of us who are more technically advanced than the average ham, I'm sure the service would receive a lot of attention."

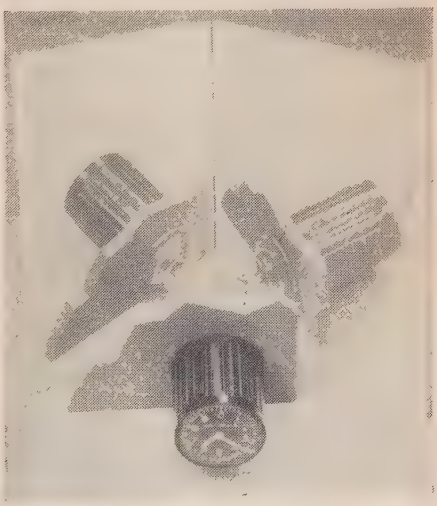
HAM CLINIC exists to help *all* hams with their technical problems, and we try our best to cater to all. From time to time we do include information which appeals to the more technically advanced ham, especially that released by the electronic industry.

Observed: All hams (from the beginner to the Ph.D) are interested in obtaining technical information. However, pleasing the majority is the aim of HAM CLINIC and we shall continue to go out of our way to help the ham-to-be and the Novice. In the process, you can bet we will not forget anyone.

Questions

HA-1 Tone—"I have a Hallicrafter HA-1 Keyer. I am very happy with it and would not have another. But of late the sidetone has been somewhat rough and distorted. I've checked everything and all seems to be normal. Any ideas?"

Yes. The sidetone in the HA-1 is generated in VR_2 which is a standard NE-2 quarter watt neon bulb. These bulbs are not always uniform in characteristics. Because they are only 10¢ each, buy 4 or 5 and try them out. You will no doubt find one that will work fine. Actual frequency determining components in the sidetone circuit are R_{27}, the 2.7 megohm resistor



Bournes miniature precision 10 turn potentiometer.

and C_8 the .001 mt capacitor. To raise the pitch of the monitor it would be necessary to either reduce the size of C_8 or increase the size of R_{27}.

Precision Pot—"I need a miniature precision pot having a resistance of 50k with an accuracy of around ±0.5%. Any suggestions?"

Yes. See the photo of the Bournes Knobpot. It is only ¾" in diameter by 1" long. It has the accuracy you specify plus a readout dial and integrated adjustment knob. It has a resolution of 0.035% to 0.11% and will operate in temperatures ranging from a –65° to a +85°C.

DX-60—"I have a DX-60 that I built from a kit. It has all kinds of grid drive on all bands, but the final won't load any better than about 50 ma. I've gone over it a couple of times and frankly I'm stumped. I also note that with this loading the rig won't modulate to the 50 ma even with the gain control fully open. Any ideas or suggestions?"

The DX-60 reports coming in are very favorable. If you are getting good final grid drive, I suggest that you check your final tube first. Then I would advise you to check your final screen voltage. Sometimes when first putting a new rig on the air there is a tendency to overdrive a final resulting in a damaged tube (grid "cook-out"). Do not overlook your final bandswitch connections either and make certain that you are loading a properly resonant antenna. Check the modulator circuitry thoroughly (including the tube)—with low screen voltage you'll have low plate current.

KWM-2 Noise Blanker—Anyone have any information on a home-made noise blanker for the KWM-2—not IFNL? We have a lot of requests for this info.

High SWR, etc.—"I built up a final using a pi-network and switched capacitors. I keep blowing one of the capacitors. What do I do?"

First, check your s.w.r., it is no doubt high. Connect a 2½ mh r.f. choke between ground and the output of your pi-network.

Current and Voltage Feed—"What is a current and a voltage fed antenna?"

A current fed antenna is one which is fed power at a low-impedance point along its length, such as a center-fed half-wave antenna. A voltage-fed antenna is one which is fed power at a high-impedance point along its length, such as an end-fed half-wave resonant antenna.

New 6146 by GE—"Hear there is a new tube made by GE like the 6146 which requires less driving power. This true?"

Sure is. The tube is a new compactronized transmitting tube designated type 7984. It is rated for 46 watts power output as compared with the rated 35 watts of the type 6146. The tube is only 2.5 inches high, has no top cap and operates more efficiently than the 6146 at commercial mobile communications frequencies—154 to 174 mc. It is *not* a direct replacement for current 6146s and the available type requires 12 to 13.5 volts for the filament at 0.58 amperes.

Tech Tip from Westinghouse—In recent years, silicon diode rectifiers have replaced selenium and vacuum tube rectifiers in most industrial power supplies and in many commercial and entertainment equipments. This widespread usage has meant an increasing load on inspection and service personnel in making rapid checks on relatively large quantities of silicon diodes to detect open and shorted units. The simple checker, the diagram of which appears in fig. 1 gives an instant qualitative check on any silicon rectifier rated at 250 ma or greater average current.

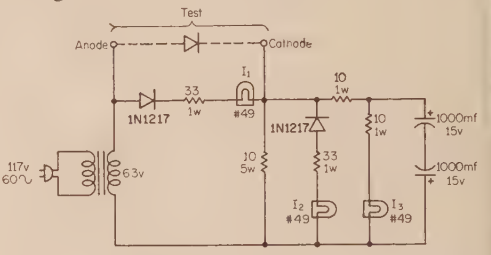


Fig. 1—Simple tester for silicon rectifiers. An open rectifier will light lamp I_1. A shorted rectifier will light I_2 and all three lamps will light with a good rectifier.

Three #49 miniature lamps are used to indicate an open, shorted or good diode. When an open diode is checked, I_1 will light; when a shorted diode is encountered, I_2 will light. A good diode will cause all 3 lamps to light up. Nothing could be simpler.

Our thanks to R. C. Braverman, and *Tech Tips* of Westinghouse (Semiconductor Dept.) for this tip.

CB Antenna—"I own a 20 foot tower on which is mounted my Mosley TA-33 beam. I wonder if I can put my 11 meter CB antenna on this tower?"

You can if the CB antenna is attached directly to the tower and not to your ham antenna boom.

Apache-Warrior-SB-10 & Phone-Patch—"With my mike connected directly to the SB-10 everything works fine. When I connect the mike to my phone patch and connect the patch to the SB-10 mike input there is constant excitation—as if I were whistling into the mike. I'm using the Apache-Warrior-SB-10 combination. What gives here?"

I'll bet r.f. rectification and feedback. Install a 75k ½ watt resistor in series with the mike amplifier grid and give her a try. If this does no good, then install a 2½ millihenry r.f. choke in series with the center conductor on your mike connector to the mike amplifier input. Bypass the connector end to ground with a 100 mmf capacitor. Make sure you are using a good ground and that your phone patch unit is grounded.

Miniature CRT—"What American cathode ray tube (CRT) having a diameter of 1½ inches or less is available for instrument monitoring

purposes?"

The NU-129 made by National Union. I am now in the process of building my "Min-O-Scope 2" using this fine little tube. When the unit is finished and tested out I hope the editor will take an article on it.

FM'ing—"I receive reports that my signals are f.m.'ing on phone. On c.w., the signals are crystal clear. What's up Doc?"

Generally v.f.o. instability is the cause of f.m.'ing. However, poor voltage regulation is another cause. If the f.m.'ing is due to the latter, a separate or more husky power supply will generally clear up the trouble. But if the instability is due to poor v.f.o. design then this is a horse of another color. Sometimes a malfunctioning tube can cause f.m.'ing—at other times it may be a bad capacitor. Check your voltage regulation first, for this is the villain in most cases of f.m.'ing.

15 Meter TVI—"One would think that the ordinary suppression measures to keep the r.f. out of the powerlines with the consequent TVI to neighbors TV sets would work. I think I've tried everything. The interference seems to leak out only on 15 meters and via the powerline. I have checked and no TV receiver affected has the old 21 mc i.f. strips. Now what can I do?"

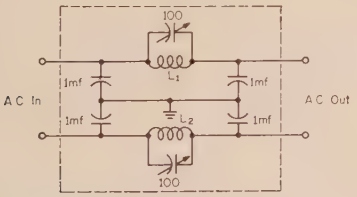


Fig. 2—An in-line type power line filter for 15 meter interference. Coils L_1 and L_2 are 4½" turns #10 3" dia. and 1⅛" long. Tuned circuits should be resonated at the operating frequency.

Try the scheme shown in fig. 2. Make sure the traps and capacitors are enclosed in a shielded enclosure. Tune the traps to your transmitter operating frequency. This particular scheme has worked in a number of stubborn cases, maybe it will work in yours. Good luck!

NC-125—"How come when I pound on the cabinet of my NC-125 that I can hear the pounding in the speaker?"

Could be a microphonic tube—check each tube by lightly tapping it with the rubber eraser end of a pencil. Then it could be loose oscillator plate sections in your main tuning gang. A little careful swagging of these will help.

CE 20A and 2 Meters—"Any new ideas on a unit to be used with my CE 20A s.s.b. exciter for 2 meter operation?"

If you will see page 6 of the *VHF Amateur* for March '62, K9EID has a fine article on such a unit. You can get a copy of the issue for 35¢ from the *VHF Amateur* at 67 Russell Ave., Rahway, N. J.

regulated at around 1/3 ampere. I have a d.c.

Voltage Regulator—"I need about 28 volts d.c. supply which can put out up to 50 volts. Any information on how this can be done—preferably with transistors?"

Yes. Thanks to RCA, fig. 3 shows a complete circuit for such a regulator using two of their new transistors, the 2N1485 and 2N1481, and their silicon voltage reference diode the 1N1781. This shunt regulator is not as efficient as the series regulator, but it is a lot simpler and will do the job. The output voltage in the shunt regulator remains constant because the shunt-element current changes as the load current or input voltage changes.

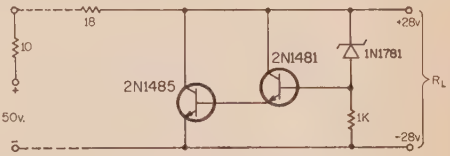


Fig. 3—Shunt voltage regulator for 28 v.d.c. output from a 50 volt source.

Book Review—Although I am not as old as some of the old-timers I nevertheless had many memories of my early days in radio flashed back to me when I read Harold S. Greenwood's new book *A Pictorial Album of Wireless and Radio 1905-1928*. Containing over 1000 photographs of operating wireless and radio transmitters, receivers and apparatus, this 223 page book even contains the prices paid for nearly every item shown.

From the electrolytic detectors to scanning disc television, the book shows in pictures what equipment the real old-timers used. The last section is devoted to showing what old radio broadcast stations looked like in their day. Pictures of Lee DeForest, Marconi, Hertz, Tesla, Armstrong and other radio pioneers are in the front of the book along with a radio chronology.

For those who want to see what led up to today's modern electronic-radio-TV era, W6MEA's book is recommended highly. You can obtain one from Hal for $3.00 postpaid by addressing him: Harold S. Greenwood, 2341 Ivyland, Arcadia, California.

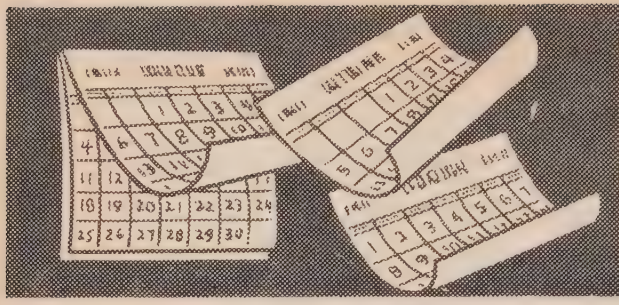
Let's Help—If you have any old radio gear around and want to donate it to a group of boys who are interested in ham radio, contact Ron DeFeo, President of the Plainfield High School Radio Club, 915 Sterling St., Plainfield, N.J.

Thirty

In August, our usual vacation month, we will not be entirely away from our typewriters. We do however, request that you hold off any questions until the middle of September, unless you have something urgent.

Thank you for reading HAM CLINIC and do send in those technical tips which are of interest to fellow hams. Until next month then, 73 and 75.

Chuck, W4VZO



CONTEST CALENDAR

FRANK ANZALONE, W1WY
14 Sherwood Road, Stamford, Conn.

ANTICIPATED CALENDAR of EVENTS

August	11-12	WAEDC C. W.
August	18-19	WAEDC Phone
August	25-26	JARL DX C.W.
September	1-2	LABRE C.W.
September	8-9	LABRE Phone
September	8-9	PERUANO C.W.
September	8-9	SSBARA WAS
September	15-16	PERUANO Phone
September	15-16	SAC C.W.
September	22-23	SAC Phone
September	22-23	MARC VE/W
September	29-30	(Open date)
October	6-7	VK/ZL Phone
October	13-14	VK/ZL C.W.
October	13-14	ARRL CD C.W.
October	20-21	ARRL CD Phone
October	27-28	CW WW DX Phone
November	3-4	(Open date)
November	10-11	ARRL SS
November	17-18	ARRL SS
November	24-25	*CQ* WW DX C.W.
December	1-2	RSGB 21/28 Phone
December	1-2	OK DX C.W.

JARL DX

In the past this All Asian DX Contest has been held the last weekend in August. This will only be its 3rd year but it has become quite popular. Probably because it's the first one of the Fall season and it offers an excellent opportunity to work some of those rare Asians. However, if the JARL hopes to continue this popularity I would strongly suggest that they circulate their contest information at a much earlier date.

LABRE

The LABRE has let this one fall by the wayside. However some activity was heard at the usual contest time last year so evidently it still exists, at least down South America way.

PERUANO

Con't understand why this one does not generate more activity. Competition is limited to the American hemispheres, which at least makes it unique and different from other contests. The phone section stirs up some activity but the c.w. week-end usually draws a blank.

2nd All Asian DX Contest Results

Continental Winners

Multi-Band

4X4NJ	54,910	W7YGN	5,518	ZS4MG	615
KW6DG	8,742	UA3CR	7,980	CX2CO	615

Continental Leaders

21 Mc					
JA1BWA	5,730	KW6CGA	2,055		
DJ2IB	3,825	HB9ZY	2,052	W6PQW	264
VK2DI	215	W6AFI	1,610	OH7NF	150
KL7WAF	104	5N2RSB	16	VK4SS	48
ZS1ACD	72	PY4GA	4		
14 Mc				**3.5 Mc**	
HZ1AB	19,647	**7 Mc**		JA1ON	42
		UA9FI	2,064	OK1AEQ	4

United States							
W7YGN	A	5518	W7HKT	"	2040	W6MDK	" 640
WL6DD	A	3798	W6WX	"	1666	W9DWQ	" 624
W5PSB	A	2496	W4KXV	"	1360	WA6IVM	" 602
W9IOP	"	2415	K6JT	"	1188	W2JAE	" 540
K6EVR	"	2100	K6DDO	"	808	WØBTD	" 490
			K6IEC	"	690	W3DBX	" 432
W1KQF	"	432	K1RTB	"	301		
WA6LYX	"	282	W1FZ	"	222		
K6BOB	"	170	WA6AYU	"	215		
W7MH	"	144	W6FLT	"	210		
W3VKD	"	133	WA6MJP	"	192		
W7DJU	"	108	W9YT	"	172		
W5LJT	"	60	W5ARJ	"	115		
K6MSK	"	54	K5UYF	"	112		
W6IRJ	"	18	WØANF	"	105		
W6WAW	"	14	WØNCS	"	48		
W3OCU	"	14	W6BJA	"	42		
K1DAT	21	65	W9WAE	"	36		
W3EPR	"	51	WA2IKL	"	32		
K8MTI	"	48	W6AM	"	30		
K4BAI	"	21	W6CHL	"	21		
WA6HRS	"	15	K5SEK	"	20		
W3LSG	"	15	K4IEX	"	7		
W3MCG	"	10	W7EWR	"	5		
W6OJW	"	5	W8MCC	"	3		
W6AFI	14	1610	W6PQW	7	246		
W8KIA	"	1602	K6JBP	"	159		
W1BIH	"	670	W7JJI	"	88		
W4KFC	"	640	W6BKI	"	36		
KØRHD	"	561	WA6GLD	"	20		
W1GYE	"	424	W8JIN	"	15		
W2WZ	"	413	W7LP	"	12		
W3CRA	"	400	K4BVD	"	4		

Alaska			
K8ETO/KL7	A	2000	
KL7CGB	A	200	
KL7WAF	21	104	
KØBYC/KL7	14	544	
KL7DIR	14	288	
Canada			
VE7EH	A	1740	
WØAIH/VE3	A	407	
VE2NV	A	243	
VE3BWY	"	216	
VE6HG	14	168	
VE2AFC	21	4	
VE2WA	14	210	
VE6HG	14	168	
VE5KY	14	84	
Canal Zone			
KZ5TD	14	14	
Mexico			
XE1PJ	A	39	

RESULTS OF VK/ZL 1961 CONTEST

C.W.

North America
All Scores

W1JYH	2133	K3PDE	24	W7POU	325
W1QMM	1248	W4BJ	2729	W8JIN	3852
W1KQF	1118	W4DQS	1416	K8VIK	124
W1BIH	1071	W4SNU	462	W8MCC	65
W1GYE	390	W4HYW	54	W8KSR	52
W1AWE	220	W5WZQ	4446	K8VUH	40
W1WY	128	W5KC	2016	W8MMZ	24
K1LBH	30	W5UYF	170	W9IHN	252
W2JAE	3220	K6EVR	3774	W9CLH	105
W2WZ	2580	W6ATO	810	WØBMM	2208
WA2OJD	377	W6NKR	520	WØMPW	1034
		WA6HRS	300	WØMCX	50
W3DBX	1056	WA6DNM	230	VE7BFN	490
W3MCG	532	W6CLZ	54	VE3BWY	260
W3BYX	136	WA6OZL	42	KP4CC	154
W3VKD	77	K7KGP	1008	XE1PJ	144

Winners Only

South America				Africa	
HK7ZT	240	KR6LY	209	FA8RJ	187
LU8FBH	152	KW6DG	6665	**Europe**	
PJ2AE	72	VR1B	5000	DL6EN	1260
PY1ADA	182	ZK1AR	1694	F8TM	77
YV5BZ	396	**Asia**		G5WP	648
Oceania		JA2JW	4773	GW3JI	180
KH6IJ	4059	EP2BB	264	HA1KSA	200
		XZ2TH	162		

HB9MO	645	SVØWI	176	VK4SS	3250
LA3UF	12	TF3AB	4	VK5NO	15220
OE1RZ	1216	UB5MZ	50	VK6RU	11780
OH1TN	546	UC2AA	198	VK7SM	7895
ON4FU	1062	UR2BU	9	VK9GP	10095
OZ7KZ	15	**Australia**		**New Zealand**	
PAØVB	253	VK1JE	2185	ZL1AH	15290
SM5LL	1026	VK2GW	11380	ZL2GS	9950
SP6FZ	640	VK3DQ	8125	ZL4GA	10390

PHONE

North America
All Scores

W3HUG	30	K6UVX	432	W8JIN	476
K5MDX	990	W6ISQ	65	K9ECE	36
W5KC	429	K7NNJ	16	VE3DDI	28
W5IKT	66			XE1CV	243

Winners Only

South America				Australia	
HK3LX	98	KW6DG	2250	VK1PM	1055
TG9AD	615	VR2BZ	360	VK2WC	4750
YV5AKP	12	ZK1AR	338	VK3BM	6605
Asia		**Europe**		VK4SN	655
JA6CY	816	CT1YE	20	VK5MS	7790
HM4AQ	175	EA3JE	16	VK7WA	1450
9M2DQ	735	G6XN	45	VK8AV	715
Oceania		OE1RZ	32	VK9NW	2920
KH6IJ	810	OH5AB	6	**New Zealand**	
KR6MF	242	SM3EP	66	ZL1KG	7885
		UR2BU	6	ZL3VI	3525

SSBARA WAS

We like this one. Primarily a USA affair it is also open to out-of-the-country stations to give them an opportunity to make WAS on sideband. Returns have been disappointing to the SSBARA committee but it's not because of lack of activity according to my observation.

S. A. C.

This will be the fourth Scandinavian Activity Contest. Conditions permitting, it can be a very interesting contest as the countries involved always have a good turnout. However, being located in a northern latitude makes them more vulnerable to blackouts and this could be disasterous.

MARC VE/W

This popular across-the-border competition has always been held the last week-end in September so with the advancing day each year it might be necessary to move it down to a week later than indicated. If the Canucks could get more activity stirred up on their side of the border this one could be a lot more interesting. Things get rather dull near the end of the contest when there are no new VEs to work.

VK/ZL

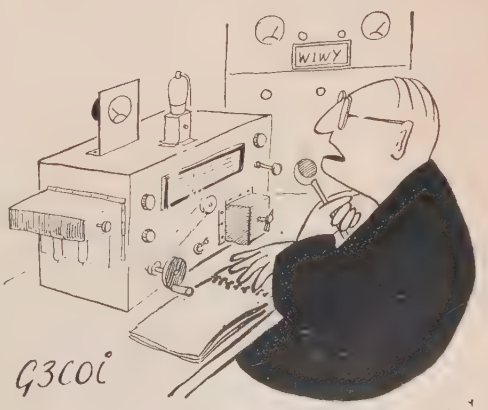
The dates as indicated have already been officially announced, but details are still forthcoming. We note that the c.w. portion could fall on the same week-end as the ARRL c.w. CD Party. This could make it real hectic for the fellows in the USA. Hope some compromise can be worked out, possibly switching the c.w. and phone CD dates around.

Ed. Note

Because of the lack of definite information at this early date it is impossible to do more than just mention the above coming events. The activities as indicated are based on last year's dates. With the exception of one or two cases the duplications on the same date are not too objectionable.

A copy of the anticipated dates has been sent to the involved organizations in hopes that they might use this information. There is certainly room for improvement and there is still time to make the necessary changes to improve the dates. Past experience has taught us not to expect too much; some of these outfits move real slow. We consider ourselves lucky if we receive routine information in time to make the final deadline. Getting everybody to agree to a perfect CALENDAR would be expecting too much. Let's give it a try and see what we have to report next month. Trust you are all having a pleasant summer.

73 for now, Frank, W1WY



"I was going to modify the receiver again, but I didn't want to spoil its resale value."

VHF

50mc. 144mc. 220mc. 420mc. and above

DONALD L. STONER, W6TNS
ALTA LOMA, CALIFORNIA

HAVING just returned from the Dayton Hamvention after a whirlwind weekend "vacation," I find it difficult to get back in the saddle. As always, the meeting was a swinging affair with a good time had by all. The v.h.f. group held sway on the 11th floor with a clear shot of Dayton (natch). Many mobiles were worked and the band activity was good even with the high convention attendance. I thought LA was the only place where you could find a QSO going at two in the morning!

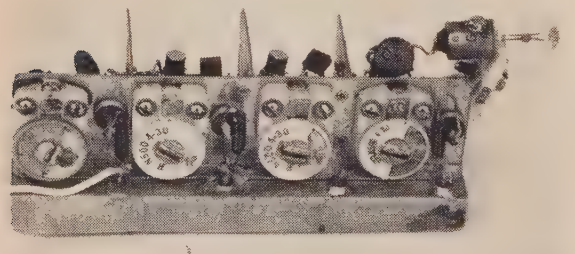
Few people back East realize what we have to contend with west of the Rockies. Few Californians are aware of the beautiful conditions existing in the plains states and on the Eastern seaboard. The majority of the state of California is covered with sizeable hills. The valleys between contain the centers of population, but to a large extent they are cut off from each other by the intervening obstacles. It is not too rough for the average station to "knife-edge" a solid signal over the top of a range into the next valley. It is the trick of dropping a signal two or three valleys away that separates the men from the boys! From personal experience it appears that vertical polarization does a 3 to 10 db better job on "knife-edge" paths which explains the difference in polarization between the east and west. However on straight shots, or nearly so, the polarization seems to be unimportant (as long as they are both the same). We do have our temperature ducts, but they seem to help only on the relatively straight shots. They do not go over the mountains. On many occasions I have heard San Diego stations direct when they could not be heard at line-of-sight locations some 6400 feet above sea level. The temperature inversion holds the signal down close to the surface. The signal can be copied below the horizon so long as the duct exists, as proved by W6NLZ and KH6UK. At least we have thousands of superb v.h.f. locations between 2 and 10,000 feet which can be reached year round by auto.

The rather exasperating v.h.f. conditions have brought about quite a rash of "repeaters" permanently located at the choice v.h.f. sites. One, K6MYK, located in the Hollywood Hills, receives on 145.14 and retransmits the signal on 146.98. It is identified and logged in accordance with the FCC regulations and provides a wonderful meeting place for hams all over Southern California. Another, WA6PCN, located at Crestline (el. 5800') covers the lower part of the state. These repeaters permit stations a hundred miles, or more, distant to contact mobiles even when "lunch-boxes" are used at both ends.

Let's Get Technical

One of the most frequent requests to this column, from transistor experimenters, is a circuit for a two meter rig with a little soup. My good friend Neil Brown, W7SLO, has come up with an excellent circuit which uses low-cost silicon transistors. It would be suitable for either 2 meters or the aircraft frequencies. Neil, who knows his way around the semi-conductor world, has conservatively designed the rig so that it can be (and has been) duplicated quite easily.

The layout is shown in the accompanying photographs. A row of rotary ceramic trimmers can be seen on the front of the chassis. From left to right these adjustments are osc., doubler, buffer and power amplifier. Note the extensive use of shielding which prevents undesired coupling between stages. The rear view of the transmitter shows the compartments



Front view of the transistorized 2 meter transmitter providing 200-250 milliwatts output. The #47 lamp at the right is a dummy load while the mica compression trimmer beneath it tunes out the lamp's reactance. The four ceramic trimmers tune (from left to right) the oscillator, doubler, buffer and power amplifier.

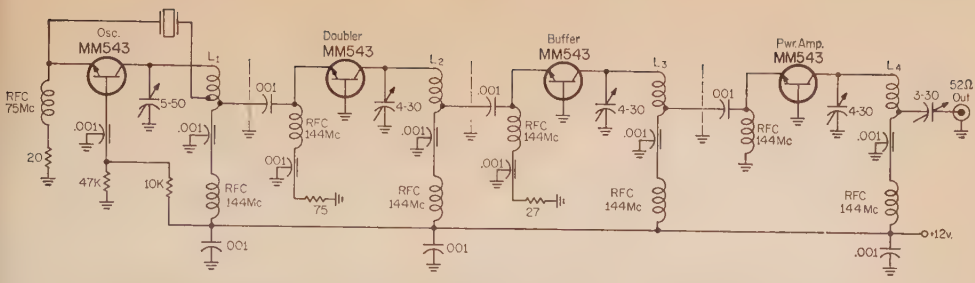


Fig. 1—Completely transistorized 2 meter transmitter designed by W7SLO using factory gradeouts of the Motorola 2N900 series transistors, designated MM543. The unit gives ample output to light a #47 pilot lamp to moderate brilliance, representing between 200 and 250 milliwatts output on 144 mc.

L_1—7t. #20 ⅜" i.d. Output tap 2t. from cold end; xtal 3t. from cold end.

L_2—4t. #20 ¼" i.d. tap at 2t.

L_3, L_4—4t. #20 ¼" i.d. tap at 1½t.

which contain each stage. The oscillator is in the right foreground and the black self-resonant 75 mc choke is near the transistor. The tank coil for the oscillator and the disc coupling capacitor are behind these components. Note also the liberal use of both glass feedthroughs and capacitor feed throughs. The remaining compartments are similar with only the resonant frequency and construction of the coil differing. The final or power amplifier is on the left and drives a #47 pilot lamp to impressive intensity. The power output with the IRE nominal of 13.8 volts, is between 200 and 250 milliwatts. The crystal and all biasing components are located beneath the chassis.

The schematic diagram of the transmitter is shown in fig. 1. The oscillator circuit is operated in the common base configuration with feedback occurring between collector and emitter. The crystal is tapped down the coil to control the amount of feedback energy. A low impedance tap couples oscillator energy to the doubler. Coil L_2, in the output circuit of the doubler is tuned to 144 mc and this stage drives the buffer. The power amplifier stage operates class B, with the negative r.f. cycles driving the stage into conduction.

No modulator data is given since this is left up to the constructor and his requirements. A simple class B modulator, with a power output of approximately one watt should be used. To obtain the best modulation, it is advisable to apply the modulation voltage to all stages including the oscillator. The additional drive, provided by the extra voltage in the modulation positive peaks, will minimize falling h_{fe} (common emitter current gain) in the output stage and increase the percentage of modulation.

The transistors used in this transmitter are of the silicon epitaxial types and are very inexpensive. The units are a gradeout of the 2N900 series and are manufactured by Motorola, Inc., Phoenix, Arizona. They have been assigned the house number MM543 and have the following specifications:

BV_{cbo}—20 min. @ $I_E = 0$, $I_c = +100$ ma. d.c.

I_{cbo}—1 ma d.c. max @ $V_{cb} = 15$ v., $I_E = 0$

I_{ceo}—100 ma d.c. max @ $V_{CE} = 15$ volts, $I_b = 0$

h_{fe} (1 kc)—20 min. @ V_{CE} 5 volts, $I_c = 10$ ma

V_{CE} (sat)—0.5 volts max @ $I_b = 1$ ma, $I_c = 10$ ma

C_{ob}—6 mmf max @ $V_{cb} = 15$ volts, $I_E = 1$ ma, $f = 1$ mc.

The transistors are priced at $2.00 each in single quantities and $1.35 in quantities of 100 and up. They may be ordered through Motorola distributors or by writing Mr. Arthur A. Powell, District Sales Manager, Motorola Semiconductor Products, 5005 E. McDowell Rd., Phoenix, Arizona. The minimum order which can be placed directly with the factory is $25.00.

The r.f. chokes are not critical and can be made by winding turns of fine wire on 1 meg, ½ watt resistors. They should be self resonant at their operating frequencies. The self resonant

Rear view of the transistorized 144 mc transmitter showing component layout and interstage shielding. The flashing copper chassis and shields are riveted together, but may just as easily be bolted or soldered. The black object in the right foreground is the oscillator emitter choke, resonant at 72 mc while the other chokes visible in the succeeding compartments are resonant at 144 mc.

frequency can be determined by winding on 20 or 30 turns and touching one lead to a grid dipper. This will cause the needle to fall. Tuning the dipper through the range, while watching for the highest reading will indicate the self resonant frequency.

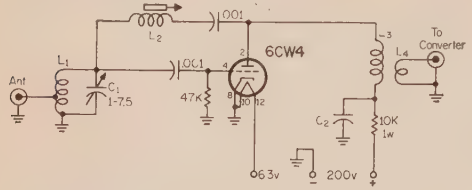


Fig. 2—Nuvistor preamplifier for the 144 mc band. For best noise figure, coil L_2 should be adjusted for complete neutralization.

C_1—1-7.5 mmf tubular trimmer.
C_2—.001 mmf button mica.
L_1—6¼t. #18 ¼" dia. ⅝" long.
L_2—Slug tuned coul 0.60 10.0 μh.
L_3—11t. #18 ¼" dia. ¾" long.
L_4—2t. link on L_3.

The *Ragchewer*, published by The Carolina VHF Society is one of the best v.h.f. club papers to cross my desk. They always have an interesting article or two and a circuit built by one of their club members. I have been collecting preamp circuits published by them for a "preamp roundup." Many of their club members have built them and the bugs are well worked out. Figure 2 is a 144 mc 6CW4 Nuvistor preamplifier and is more or less standard. The tap on the coil L_2, and C_2, should be adjusted for best noise figure. The stage is neutralized by disconnecting the plate voltage and adjusting L_2 for minimum signal feedthrough. Figure 3 is a favorite 417A circuit in the Carolinas. The tap point and the spacing of L_1 should be adjusted for minimum noise figure.

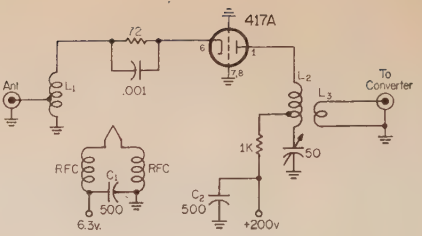


Fig. 3—A 2 meter preamplifier using the popular 417A or 5842 Western Electric triode. No neutralization is necessary if shielding is properly employed. A shield should be placed across the 417A socket to isolate the input and output. The four grid pins may be soldered directly to this shield.

C_1, C_2—500 mmf button standoff type capacitor.
L_1—4½t. #18 ½" dia. ⅝" long. Tap 2½t. from ground.
L_2—8½t. #18 ⅜" dia. ⅞" long. Tap 4t. from plate end.
L_3—2t. hookup wire on cold end of L_2.
RFC—12t. #22 ¼" dia. ½" long.

Figure 4 is an outgrowth of the 416B controversy. Brian, W4OAB says "The general consensus of opinion seems to be that blower cooling of a 416B is unnecessary. Plate voltage shouldn't exceed 125 volts and a 2 ohm wirewound pot in the filament lead should reduce the heater current as low as necessary. The lower plate voltage would mean a higher noise figure, but the bias should also be reduced so plate current is about 10 ma. Normal G_m, I understand, is about 50K, but even operation in this manner gives you a G_m in excess of 25K and you don't have to go to 25 ma plate current."

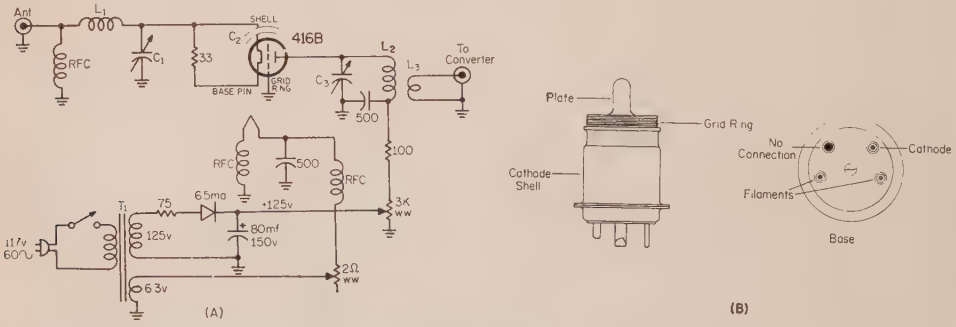


Fig. 4—The ultimate in a tube type preamplifier for 144 mc using the gold plated 416B or 6280 planer triode made by Western Electric. The tube normally requires forced air cooling, but if plate and filament currents are limited to low values, no harm will result from convection cooling. Connections to the tube are shown in (B). Note that the r.f. connection to the cathode is made to the outer shell while d.c. connection is made to the cathode base pin. A heat dissipating plate cap should be used to aid in controlling plate dissipation.

C_1, C_3—1-10 mmf piston capacitors.
C_2—Internal capacitance between cathode and 416B shell.
L_1—6t. #20 ¼" dia. ½" long.
L_2—6t. #20 ⅜" dia. ½" long.
L_3—1t. link at cold end of L_2.
RFC—14" #20 e. close wound on ⅛" dia. form.
T_1—Power transformer. 125v. @ 50 ma, 6.3v. @ 2.0a. Stancor PA-8421.

Who's News?

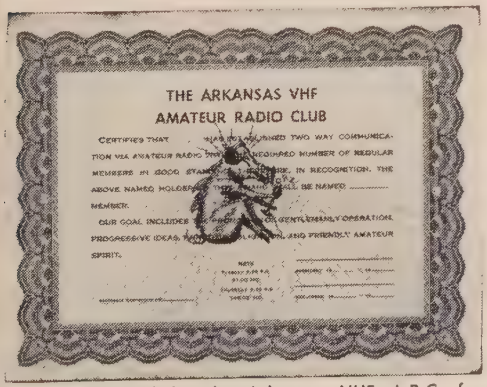
A recent letter indicates that Rodolfo L. Roeske, LU8OI, is going the parametric route on both 2 and 1296. He requested information on diode and klystron sources. Rodolfo says that the government now permits amateurs to freely import supplies needed for their stations. Too bad some of the other countries down that way are not quite so far sighted!

Ronald Mangum, K4GPL, 1010 Idlewood Dr., Greensboro, N. C., says that the VHF Century Club award has done a lot to promote 2 meter activity in his part of North Carolina. He says also "We have about 180 stations in this area now. Most are low power, but W4BUZ and myself are working on kw rigs. Hope to have them going in a couple of months".

Joe Bean, W7VBH, 2560 S.E. 5th Avenue, West Linn, Ore., is still copying W6FZA and W6NLZ on 50 mc scatter each Sunday A.M. He continues "W7MAH and W6NLZ have failed to get together of late. Each have tried on opposite week ends. Alan, FZA had solid 15 minute code wheel and four 2½ minute solid CQ's on April 15. Both FZA (c.w.) and NLZ (s.s.b.) very good this A.M. (1730 to 1910 GMT)"

This year's *CQ* VHF Contest probably was the best ever in N.C. Wintertime conditions were all they had with the high winds, but heterodynes were many nevertheless. Casey, WA4AET and Cecil, K4VAZ fought 28 degree weather on a mountain top near Lover's Leap in Virginia. Cold as it was you could tell he was having a ball by his laugh! His signal in N.C. was stronger than most locals. K4WVP (or was it WUP) was also portable on a mountain south of Graham. Good to hear all the activity.

Certificate hunters—'tention! Forward 'harch! Betty Anderson, K5YSI, lets it be known that the The Arkansas VHF Amateur Radio Club is making their Razorback Certificate available to anyone who contacts three club members on either two or six meters. Betty says the animal in the middle of the certificate is the Arkansas Razorback hog, now extinct except on the football field!


THE ARKANSAS VHF
AMATEUR RADIO CLUB

CERTIFIES THAT

Certificate issued by the Arkansas VHF A.R.C. for working three club members on either 6 or 2 meters. The "creature" adorning the center of the certificate is an Arkansas Razorback hog!

News from North Carolina courtesy of W4BUZ, K4SNF, W4OAB *et al*—Who says that two meter men don't work Six? K4SNF worked (of all people) K4MHS and K4YYJ. John and Jim both have good signals on 50 mc. Everyone is waiting for E_s openings. Short bursts were heard on the 25th of March. K4IHO and K4WYV have a MARS net on Thursday nights at 9:30 P.M. They request that you check in if possible. WA4DKU has ordered a HI-Bander for six and two. Red reports he has worked 88 different stations with a Heath Twoer with a Finco [we'll need a Century Club Lunchbox certificate soon—*ed.*] W4WDH has completed a new AMECO Nuvistor converter and reluctantly admits plans for s.s.b. on 2. He has a 32 el. colinear array up about 70'. New final in the making. W4RRK says he has had more fun with the Heath Twoer than with 500 watts on the low bands. W4HJZ has a 432 converter per the '62 handbook going in Raleigh. W4MEJ is on 432 with 100 watt capability. They have worked 432/144 crossband about 8 miles across town. W4BSS and W4CAH, John and Jerry have made first cross town contact in Charlotte on 432. Signals were FB. Kept tuning for breakers. There were none. Brian and Bud, W4OAB and W4SVP, will be on 432 soon.

From up Michigan way Doug De Maw, W8HHS, fills us in with the latest happenings from his area. He pens, "We have again stimulated v.h.f. enthusiasm in the Traverse City area. He have 11 active stations on 144 mc presently, W8's REI, BVP, HHS, EEF, JUY, LKR, ALN and ZTB, along with K8's WPS, HAD, IEI. Not bad for a small area like this. In the group are three mobile stations in addition to fixed rigs for each of the above call signs. Much experimentation has been carried out by W8HHS and W8BVP with mobile antennas. These include verticals, halos and turnstiles. We are predominately horizontally polarized in this area and many of our fixed stations are equipped for either polarization. Our findings indicate that the two meter turnstile is far superior in all respects over other mobile antennas for our area. Flutter and deep fades in dead areas are noticeably reduced and overall signal strength is db's better with the turnstile. More mobiles are coming shortly and we will be looking for W9's in Wisconsin and Illinois from the Lake Michigan shoreline very shortly. The above stations and mobiles are on 145.206 seven days a week at 8 P.M. EST. We will be carrying portable beams in the mobiles and looking for DX when the inversion starts soon. There will be six meter activity from this area soon. We have two stations built presently."

From the world of Century 21, Evergreen 50 and Up Society Reports, "Many of the six meter hams have been turning their

beams to the Northwest on Saturday and Sunday mornings between 8:30 and noon and having some FB QSO's with the VE7's in Vancouver BC. They come in the Seattle area about 59 and better. Both VE7OE, Tom and VE7IR, John, have been worked. Among the locals with the VE7 contacts are K7HEF, PXN, BKZ, ISI and W7ZQX who has mailed portions of tape recordings to the VE7's to show how well they are heard there. Two Seattle hams have been doing some portable amateur radio operation from the top of the 600' Seattle World's Fair Space Needle. W7IDI, Jerry Fortier, has the honor of being the first ham to operate from this wonderful view spot. His operations were via a CB walkie-talkie converted to 10 meters. K7BRQ, Tim Pettis, made a series of fine business contacts during the past week. He was using a URC-4 walkie-talkie which had been converted to six meters. He was receiving very fine reports from all over the Seattle area. W7IDI also lays claim to be the first ham to operate as monorail mobile. Wonder what these rascals will try next?

Operation moon bounce de W6DNG—During the second week of May 1962, W6DNG Long Beach, California, will begin moonbounce operations on 144.002 mc. Until skeds are made with other stations, W6DNG will xmit three 30 minute periods when moon position permits at 0200 GMT (1800 PST) 0500 GMT (2100 PST) and 0800 GMT (Midnight PST). Any one, two or all three transmissions will be made every nite that he can get a location on the moon. Stations interested in schedules, please write pronto, giving exact freq., dates and times you can sked and your telephone number complete with the long distance area code number. W6DNG's equipment consists of 1 kw to p-p 4X250B's to 23 db circular polarized antenna on equatorial mount, manual or automatically controlled right or left hand polarization. The receiver is a para-amp or 416B amp to a 75A-4, to an audio filter, to recorder and then to headset. All sending will be manual at approximately 5 w.p.m. He will reply to all sked requests, but as time is limited, please no requests for equipment description or building instructions. He plans to devote all his spare time to skeds and correspondence pertaining thereto. Bill says "The main things for moonbounce operation is low noise, high gain and selective receiving system, high power xmitter, antenna above 20 db gain with elevation and azmuth facilities, a lot of patience and an up to date *Almanac*. A recorder is important too!" If you want to line up for skeds, write to W6DNG, Bill Conkel, 4608 La Cara, Long Beach 15, California, area code 213, Geneva 8-8825.

From up frigidsville way, we learn that KL7DJI is operating on 145.3 mc and is interested in scheduling other Alaska stations (think big!) with a view toward DX. Bob will have 32 elements on 2 meters in the next weeks.

An English walkie-talkie manufactured by A. C. Cossor Co., Ltd. and used by firefighters in the London Fire Brigade. The unit, which weighs only five pounds, features a vox circuit. It operates in the low v.h.f. bands.

KL7IS is running 64 elements on 2 and works into Anchorage regularly by bouncing signals off of Mt. McKinley. He is located in Minchumina. Jerry, KØCST/KL7 sports a new homebrew transceiver for the 145 mc band. He hopes others will follow suit soon.

Wally Dobson, WA4AJC (Apple Jack Charlie) puts the lid on with, "Am looking for groundwave contacts on 6 meters here in Nashville, Tenn. Am running a Johnson Ranger II and Hammarlund HQ-110C receiver with Nuvistor preamplifier and a single 624 optimum spaced Telrex beam 75' up on a Rohn tower." Wally has confirmed contacts ground wave on phone with N.C., Va., Ohio, Ind., Ill., Ky., Ark., Miss., Ala., Ga., and hundreds of Tenn. towns from one end of the state to the other. He is particularly interested in contacting Missouri and S. Carolina on ground wave. This range seems to be three to four hundred miles. Wally operates from 5:00 to 7:00 A.M. CST almost daily and after 9:00 P.M. CST on 50.11, 50.25 or 50.5. Drop him a line at 3939 Plantation Dr., Hermitage, Tenn. for schedules.

That makes our E(nergy) sporadic for another month. The mail response looks very encouraging, but those cards and letters are always welcome. Don't forget to send your reports on OSCAR II to the tracking center at Sunnyvale. 73, de Don, W6TNS

Reciprocal Licensing Bill S. 2361 needs your support. Write your representative today!

sideband sideband sideband

SIDEBAND

IRV and DOROTHY STRAUBER, K2HEA/K2MGE
12 ELM STREET, LYNBROOK, NEW YORK

SSB DX HONOR ROLL

TI2HP	261	PZ1AX	218
VQ4ERR	258	WØCVU	210
W8EAP	258	WØUUV	209
W8PQQ	256	K6ZXW	206
W2ZX	250	W3KT	205
HB9TL	250	W2VCZ	203
W6UOU	248	W2VZV	201
PY4TK	245	G8KS	201
W2FXN	240	W2YBO	201
WØQVZ	236	K5MDX	201
K9EAB	235	TG9AD	200
K4TJL	233	K1EJO	200
MP4BBW	232	K1IXG	200
K2MGE	230	DL1IN	200
ON4DM	230	K4PUS	198
W6PXH	229	W1AOL	190
W2JXH	228	W3VSU	188
K8RTW	226	K6MLS	187
W6RKP	226	PJ2AA	186
W4OPM	225	G2BVN	185
W1LLF	221	W6EKZ	181
W6WNE	220	W5RHW	180
W3MAC	220	K4AJ	176
W5IYU	220	W1ORV	175
W3LMA	219	WØPGI	175

CQ SSB STICKERS AND CERTIFICATES

Worked 250

W2ZX	HB9TL

Worked 200

DL1IN	W2YBO
G8KS	K5MDX

Worked 175

PJ2AA

Worked 150

K1IDW	UA3FG
W9EXY	WA2IZS

Worked 125

W9EXY	UA3FG
G6UT	W3HQO
W4NJF	K8PUU

Worked 100

K9IUI	W4RLS
DL4ZX	W5DVV
DL4ZW	UQ2AN
G3AIZ	K8PUU
KØJTW	WA2EOQ

Worked 75

W2LLI	K8BTL/6
DL4ZX	W4RLS
DL4ZW	W5DVV
K4SDC/CN8	K8PUU

Worked 50

K1BVI/2	W4RLS
DL4ZX	W5DVV
DL4ZW	K8PUU
KØKBY	K3PQO
K5FLD	K9DTZ

It's not everyone who can drive for fourteen hours to and from the Dayton Hamvention with four lively children and a newly-arrived ZS visitor and still manage to have a wonderful time but we did it! Of course, Peter, ZS6BBB, contributed greatly to our enjoyment of the occasion because he was so obviously delighted with our country and the hundreds of W/K hams who made him feel at home, and the kids cooperated to the extent of disappearing in the movies or up in the room watching TV so our four days away from home were very well spent. As in the past, one of the first to greet us was Gus, K9EBA, from O'Fallon, Illinois, who has been to many conventions and Sideband Dinners with us. And following close behind Gus was Ed, K8RTW, and a host of others who always make our visits to this wonderful affair so enjoyable.

Peter also soon found himself among friends as he was introduced to Bart, W8NWO, and Ken, K8OHG, who were on the DXpedition to VP1WS while Peter was operating from ZS6PC/ZS8. Comparing notes, they found that Peter was the only ZS that the VP1 boys had worked. Word soon spread throughout the hotel that a distinguished visitor was among us and Peter probably shook more hams' hands in Dayton than he has since he's been licensed!

For those who have never visited the Dayton Hamvention, it's a wonderful mixture of fun, forums, and friends—the fun of visiting "hospitality suites" set up by the North Jersey DX Assn., Collins Radio, and Hallicrafters, among others; forums on every conceivable topic of interest to hams; and friends from far and near.

The Sideband Forum, which was organized and presided over by K2HEA, drew a large quota of visiting hams. Speaking on "The Future of Sideband" were Fritz Francke of The Hallicrafters Co.; Al Robertson of The Heath Co.; Clem Wolford and Milt Sullivan of the R. L. Drake Co.; and Jim Taylor of Collins Radio. Talk about a "sock finish"—Jim pulled the surprise of the day when he nonchalantly presented a 30L-1 linear final to Earl Ringly, K8DDB, whose call was picked from a box containing the calls of all those who attended the forum. To say that Earl was delighted is the understatement of the year—he was stunned, bewildered and overjoyed all at the same time and it probably took quite a

Comparing DX notes after the Dayton DX Forum are l. to r., Howard, W2PUN; Ross, W9RBI, high scorer in the CQ DX Quiz; Sax, W2SAW; Dorothy, K2MGE; and Peter, ZS6BBB.

Another new product that drew the crowds at the Dayton Hamvention was the Hallicrafters transceiver which Fritz Francke, center left, is shown discussing. (Photo by K2HEA)

while for him to realize that the linear was his.

The Banquet, which was the finale of the Hamvention, was most enjoyable, characterized as it was by the presence of almost the entire *CQ* staff on the dais and also Peter, ZS6BBB. Goodwin Dosland, then President of the ARRL, delivered the speech of the evening and again proved what a superior speaker he is while Dana Cartwright, W8UPB, ARRL Great Lakes Division Director, was the recipient of the annual Dayton Hamvention Award. Dan McCoy, W8DG, performed a great job as M.C. As you will no doubt read in greater detail in K6BX's column, *CQ* Editor Arne Trossman presented the first of the USA-CA 1000 awards to Dick McKercher, WØMLY, and Les Jeffery, W8WT, as a special event during the Banquet's program. The prizes were fabulous, as usual, and may we display a little parental pride and say that it was our daughter, Peggy, who was asked to perform the pleasant chore of drawing the stubs from the prize box!

To Joe McNutt, W8GFN, General Chairman, and Bob Montgomery, W8CUJ, Asst. General Chairman, and their entire Committee, we again doff our hats and say "well done"!

Hybrid Coupler

Now what the heck is a Hybrid Coupler? By now you avid readers of the equipments ads have run across the Waters Manufacturing company ad for their Coupler and we can almost hear the comment, "What? Another phone patch?".

Well, we're here to state that this is not just another phone patch; in fact we consider the phone patch as but a minor feature of this amazing device.

We hope to review this unit in more detail at another time but we think a few words about some of the uses that can be of immense value to you are in order. By throwing a switch, you can simultaneously record your transmissions and those of the stations you talk with. With the proper adjustment of controls, your tape recorder will then record and play back both sides of the QSO. Now when you have visitors in the shack and the bands are dead, you can turn on your tape recorder and let your visitors hear what goes on when things are real lively. Might even save your face when the boss shows an interest in hearing some DX and the band is reaching out almost as far as the next town!!

How many times have you been asked for a signal report? And how many times have you been inclined to say, "Boy, what a lousy signal, *etc.*?" Now you can avoid the embarrassment and let the other guy hear for himself!! Our experience has been that it is of inestimable value in giving qualitative reports of received signals.

Another valuable use is that of checking your own signals. You can hear exactly what your signal sounds like and correct any defects by yourself without having to continually ask for someone to monitor and tell you what it sounds like; sometimes the report itself is far from satisfactory.

There are other functions available; you can play back over the air any tape recorded conversation by merely turning the function switch; you can use it to record telephone conversations; (when permitted) and you can record any phone patch you run for later playback.

Our opinion is that this unit can be a valuable operating aid used in conjunction with a tape recorder; we are sure that more uses than briefly outlined will be discovered in time by our resourceful ham fraternity.

Sideband Handbook

For the newcomer to Single Sideband; for the Novice ready to graduate; for the "old timer" too, there is now a book available, *Single Sideband Communications Handbook*, which covers such things as sideband generators, r.f. amplifiers, mixers and converters; in fact everything about sideband from A to Y. Written by Harry Hooton, W6YTH and published by

Bernie, W9HTF, and Cris, K9AMC, listen in rapt attention as Peter, ZS6BBB, explains that, back home in Johannesburg, he does *not* live in a mud hut surrounded by howling lions! (Photo by K2HEA)

Howard W. Sams and Co., its thirteen chapters provide a wealth of information for the ham operator.

We particularly liked the chapter on Carrier Suppression Techniques which explained, with clarity, the operation of the balanced modulator; perhaps the least understood of all sideband circuitry. Through the use of understandable vector analysis and block diagrams, Mr. Hooton has succeeded admirably in showing how various circuits may be used to suppress that "ole debbil" carrier.

Written in clear, concise language it has successfully avoided the usual pitfalls of many manuals by presenting its wealth of information without being overpoweringly technical nor is it too simple so as to read like a comic book.

Profusely illustrated with circuit diagrams, the book is a valuable addition to sideband literature and we recommend it as required reading for anyone interested in single sideband.

The "Z"? Although it probably is not within the scope of the *Handbook*, we would like to have seen something on operating procedures.

Signal Losser

If you've ever had the experience of trying to pull in a "weak one" just as your neighbor two blocks away opens up with his 2 kw p.e.p. "Super-dooper", you need help, but fast! Cussin' seems to help, but it doesn't solve the problem quite as neatly as does this little gadget described by Uda Ross, OA4J, ex-W2UD. Uda, long a resident of New York, has taken up residence in Lima and is experiencing the wonderful feeling of being DX.

Our receivers are built to take advantage of the great sensitivity of new receiving tubes and become more liable to blocking from strong adjacent channel signals; being able to control the front end of your receiver at will can be a valuable asset and Uda has come up with a real simple and effective way of doing it. But let Uda tell it in his own way.

Most hams do not realize the very considerable amount of energy radiated by even a low power Single

Milt Sullivan, K8YDO, chief engineer of the R.L. Drake Co., describes the fine points of the new Drake Transceiver which should be available this Fall.

Two of Skokie, Illinois' claims to fame are Mel, K9HVE, and his lovely XYL, Anne. Sideband also claims Mel as an ardent advocate and he is regarded as a top operator with a superior signal.

Sideband transmitter. Just a few years ago transoceanic communications by telephony between the Caribbean "Banana Republics" and the United States depended on some very compact 350 watt transmitters which were fed into the AT&T long line circuits through the Miami terminus. Even longer overseas hauls for a long time depended on 2 kw s.s.b. transmitters. I am talking about commercial everyday toll telephone service with its considerably greater requirements than we have in our ham circuits. Consequently we should learn to respect the possibilities of our equipment. Present efficient antenna arrays at both ends probably give us another 15 or 16 decibels of gain. Small wonder then that our receivers block when the station two blocks down the road comes on.

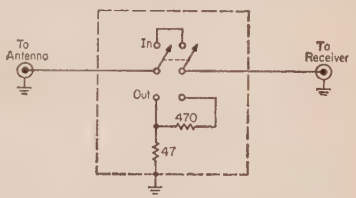


Fig. 1—Circuit of a simple Signal Losser or 10 db attenuator for use before an amateur receiver having 50 ohm antenna input. Attenuation of 20 db can be achieved by raising the 470 ohm series resistor to 4700 ohms.

In some instances the field strength of the transmitter at a nearby receiver must be in the order of *milli* not *micro*-volts! Also if the s.s.b. transmitter is being operated by someone not yet familiar with proper practices in s.s.b. operation, chances are that he has the audio gain up high enough to get a healthy swing on the plate meter needle with its consequent disastrous effects for miles around. Unfortunately some of our eager brothers looking for a good report from a DX station will give that station a very clean report on his modulation. This is indeed discouraging. I have heard some very excellent reports on clean transmission without splatter given to some very bad offenders.

Receiver manufacturers have gone all out to design receivers for the utmost in sensitivity, but many have not given thought to the problem of strong local interference. The requirements for elimination of such interference are contrary to those for high sensitivity. I am probably going to lose some readers at this very minute when I remark that the device I am about to describe is a "losser" rather than a "gainer". But, the fact remains that it is a very useful gadget at my shack and is usually left in the circuit at all times!

[*Continued on page 112*]

BY WALTER G. BURDINE, W8ZCV
R.F.D. 3, WAYNESVILLE, OHIO

Novice

THE eleventh Dayton Hamvention is past history. I met almost all of the editors of *CQ* and a large number of the nation's hams. I enjoyed many of the things that happened at Dayton although I did not get time to attend any of the meetings and forums that were on the program. The Hamvention, as always, was well attended and the programs were well placed. At the end of the all-day meeting, the banquet was attended by about 650 hungry people waiting for the big prize drawing and dreading that long drive back home. I doubt if ZS6BBB went home that night, I believe he was the ham "the longest way from home."

I met a large number of Novices and I'm amazed at the number that still think the Novice licensee isn't a true ham. This I do not understand. I sure wish that the Novice license was available when I was studying for my ticket. True, it is not renewable, but no one wants to be an apprentice more than once, and this is an apprentice license. You should want to go on to bigger and better things. It is my opinion that a large number of the hams with higher grade licenses could use some of the training that naturally comes to the Novice.

I enjoy going to the ham gatherings and plan to attend the one at Lancaster, Ohio. I hope to run into some good material for the column there and then I hope to attend the West Virginia Ham-fest at Jackson's Mills, West Virginia, July 7th. We will fly there and back as it is too far to drive and then be able to get to work in Dayton the next morning.

I must apologize for the letters that have not been answered. Somehow I will get these letters answered and I'm looking to you for more letters, pictures and ideas.

Lead Identification

I have received a few letters asking how transformer connections can be identified if they are not marked, and how to compute the current that can safely be drawn from the secondaries. Here is one way of identifying the secondaries of transformers in use at the shack of W8ZCV.

Determine the different secondaries of the transformer by using your ohmmeter for checking the continuity of the windings. The winding with the lowest resistance (the largest diameter wire) will be the one that carries the most current and provides lowest voltage. Mark each pair of wires and be sure that the ends do not short or touch, remember, the high voltage secondary will have voltages ranging from 250 volts to as high as possibly 5000 volts depending upon the use of the transformer.

A small filament transformer delivering either 2½ or 6.3 volts can be used to check the transformer by applying the 2½ or 6.3 volts to the secondary with the largest wire (lowest resistance) and measuring the voltage from the other secondaries of the transformer under test. *Be Careful:* use the meter on its highest scale first, as high voltages will be present. The primary of the transformer can be found by measurement of the secondary output voltages. If you are feeding the 2½ volts from your test transformer into a 2½ volt secondary of the transformer, the output voltages will be the same as if you were feeding 117 volts into the primary. If 2½ volts is fed into a 6.3 secondary, the output voltages will be lower by the same ratio or approximately 2/5 of the rated voltages. The primary would be read about 43 volts, other voltages reading correspondingly lower.

After identifying the primary, the output voltages of the secondaries may be measured with the primary connected to the 117 volt source. Be careful, use the meter correctly, remember high voltages are present and can be dangerous. Feeding a low voltage into one winding of any transformer and measuring the output voltage of the secondaries can tell you much about the use of the transformer. Caution: some power transformers have tapped primaries, don't let this fact throw you off when making voltage measurements.

Current Capacity

After identification of the connecting leads of a transformer the current carrying capacity of the winding must be determined. If the actual wire of the secondary is exposed, the size of the wire can be used to judge the current capacity of the winding. Use the wire tables in any radio handbook and take half the listed current capacity as the secondary current capacity. Transformer manufacturer's catalogues can be used to supply specifications for many of the transformers that will appear in the junk box. Some times the weight of the core materials can be used to judge the amount of

current that a transformer can supply. If a transformer is overloaded the transformer will heat and that can also be used to guess its current capabilities. Draw progressively less current until the transformer operates at a reasonable temperature.

Some transformers can be used for purposes other than that for which it was designed. In an emergency a power transformer can be used for an output transformer, use the high voltage secondary for the primary and the filament leads for the voice coil leads. This will work until a proper replacement can be obtained. Some 400 and 800 cycle power transformers can be used as modulation transformers. The units with multiple high voltage secondaries will work very well and can be used to approximately match the tubes used. Reading the handbooks and using your head a little will solve a lot of problems when an emergency arises. Enough transformers to keep any ham on the air can be found in old television sets discarded by TV dealers or sold for five or ten dollars. Sam's *Photofacts* will furnish transformer information for any TV transformer at a very nominal fee.

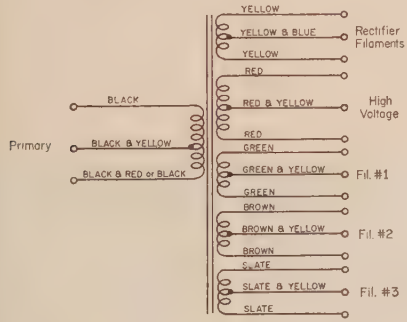


Fig. 1—RMA color code for power transformer leads.

Transformer Color Codes

Transformers leads are normally color coded with a standard RMA (Radio Manufacturers Association) code. Some older transformers, however, may not use this code, so it is necessary to use a little extra caution when a transformer of unknown origin is to be used. The color code has application to both audio transformers and power transformers and is illustrated in figures 1 and 2. The code shown in fig. 2B is also used on most standard i.f. transformers. Most power transformers as used in recent electronic equipment will not have all three filament windings as shown, but this does not affect the application of the color code.

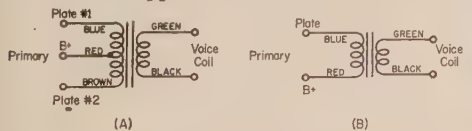


Fig. 2—(A) RMA color code for push-pull audio output transformers. (B) Color code for interstage audio transformers and single ended audio output transformers.

Net News

The following Texas hams would like any information about nets in Texas. They are interested in c.w. nets. Ervin Grosshans, Jr., 2726 Coleman, San Angelo, Texas. He is K5FNI. Keith Roberts, KN5LSM, 1627 South Park Street, San Angelo, Texas, and Ben McKinney, K5HQV, Route 1, Box 261-D, Laredo, Texas.

Novice and Technicians nets will be printed in this column if you will send the information to me. Operating in a net is a good way to gain code speed and it will make the learning a lot easier.

Letters

I appreciate the nice supply of letters received this month. When I turned the column over to Don back in 1957 I was getting about fifty letters a day and that gave me more news for the column than I could use. Let's see if we can get things moving again. I am sure you have something interesting for *your* column. Read on and then send me your letter.

Ladies first this month, and don't think you have just opened the pages of a beauty contest judges report, but I sure would like to see one that could top these YLs, wouldn't you?

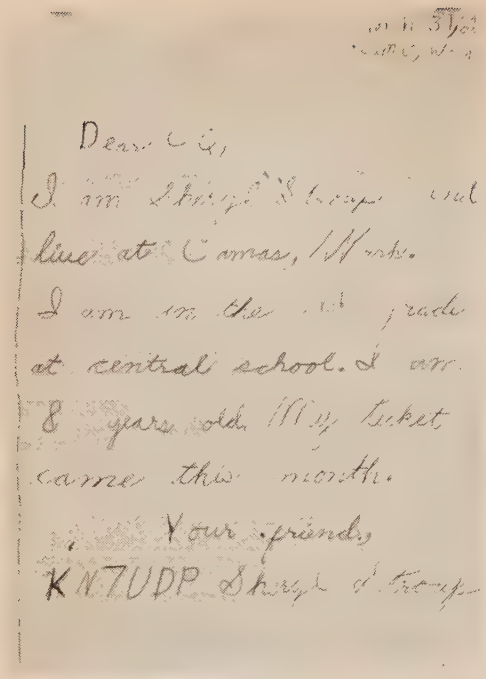
Top-notch YL operator Sheryl Stroup, KN7UDP, 2153 N.W. 6th Avenue, Camas, Washington writes this letter:

"Dear Walt, I am sending another snapshot. I am 8 years old and in the third grade. I got my ticket on March the 3rd. Mr. Elliott, W7LLA of Vancouver, Wash. gave me my Novice test because my daddy thought a stranger should give me the test.

"The receiver is a Hallicrafters S-53A and my c.w. xmitter is a Hallicrafters HT-40. I have three 80 meter crystals. I do not have antennas for 15 and 40 meters now.

"I have had many 2 meter contacts. The band is active around Portland, Oregon which is 15 miles from here. All but two of the QSLs

My vote for Washington's Queen of Ham Week goes to Sheryl Stroup, KN7UDP of Camas, Washington. Sheryl is 8 years old and operates 2 and 80 meters, look for her on the other bands after school closes for the summer.



Dear CQ,
I am Sheryl Stroup and live at Camas, Wash.
I am in the 4th grade at central school. I am 8 years old. My ticket came this month.
Your friend,
KN7UDP Sheryl Stroup

A short note from one of the cutest (and youngest) little Novices on the air. Sheryl Stroup, KN7UDP announced her new ticket to the CQ gang in this way.

in the picture I got on two meters, also some have not QSLed yet. The "Gooney Box" is an old one. It has a 2E26 modulated by a 6V6.

"Later on I hope to work some DX when school is out and I can stay up later. I have never gotten anyone out of the 7th district yet. I look at the YL pictures in *CQ*. My daddy knows Orissa, K7KHU and Mary, W7BII in this month's *CQ*. 73 from Sheryl, KN7UDP."

Well, Sheryl I thank you for answering my letter and I must say that you write better than some of us older folks. Thanks for the colored snapshot, I have it on my desk. I'm very happy to see you younger folks getting amateur licenses and I hope you work a lot of DX when summer vacation arrives. I believe 15 meters would be your best bet for DX and I'm sure that those amateurs who have not QSLed and those you work from now on will QSL. By golly, I would like to work you and I promise a QSL for sure. Good luck and write me a letter when you get on the other bands to tell me how you are doing. Again, thanks for the dope on the amateur activities around Camas.

Dog-gone-it, I've been trying to think up something witty and smart to say about the YL in the next letter, but she leaves me speechless. Old Mick Coleman, W8QJI has his eye on a star for sure. You don't need glasses to see that he is right. Her mom, Ruth, K8GYK, poses a question in her letter.

"Dear Walt, Here is the picture you asked for of Betty Lou, K8YXR. I just wonder if there are other professional dancers that are hams? I think it would be quite interesting to find out, don't you?

"As you know, Walt, we are quite a ham family, but we'll be more-so later. Here's why. You remember Mick Coleman, W8QJI, who was with us when we came up to Gentile after the Mars-vention, he is now Betty Lou's fiance. Let me list the hams in our family for you.

"Betty Lou has been a professional dancer for two years, at present she is dancing in Boston, Massachusetts. She is 18 years old. Her fiance is Michael Coleman, W8QJI, a General.

"Her Novice license expired in March, she now has her Technician license and will try for her general later (not enough time now). Now for the family (we hold *our* conventions at family gatherings): Dad, W8VBG, Russ; Mom, K8GYK, Ruth; Brother, K8GYJ, Ronald; K8YXR, Betty Lou; Uncle, W8UNV, Bob; Uncle, W8SUO, Ed; Fiance, W8QJI, Mick; Mick's Dad, K8VZW, Glenn.

"Betty Lou studied dancing in Cincinnati with O'Neill Studios for 12 years. K1DZG, Abe Stanford, in Boston makes phone patches once or twice a week [from Betty Lou] to us here at home (W8VBG) and we talk for an hour or more.

"73 and 88, Ruth, K8GYK"

This family is an all-ham family and is one of the really nice families I have known for a long time. I first talked to Russ over a small

Betty Lou Seilkop, K8YXR is on her toes. She has been a professional dancer for two years and an amateur (I don't dare use the term ham) for almost as long. At present she is dancing in Boston, Mass. and is the future bride of Mick Coleman, W8QJI, formerly of Loveland, Ohio, one of my county's prettiest ladies.

station owned by Red Martin, W8VUZ on 160 meters and met him later in Cincinnati in 1939 or 1940. Red's station was a 6L6 modulated by a 6L6. Russ and Red helped to form a lot of my ham ideals; I am better off for having their friendship and help.

"Dear Walt, Here's a letter you can put in NOVICE, but I am not a Novice any more. I always read your column and I operate a good deal in the 40 meter Novice band.

"I am trying to make WAS with only six watts home-brew on 40 meters. The rig uses a 9002 oscillator and a 5763 final. The antenna is a half-wave dipole up 24 feet—this is to be raised, but so far, at least, it has done a good job here, low as it is. The receiver was a home-brew 5 tuber, but now it is a new SX-111.

"I started on this project (WAS) last January first. I have worked 42 states with 37 confirmed. The "peanut whistle" gets out FB, in fact, I have just this morning worked WH6ENH in Hilo, Hawaii with my RST being 549. This is not too bad considering the low antenna.

"I need to finish this project by the middle of July. I need skeds with Alaska, Idaho, Arizona, Montana, Maine, Georgia, Arkansas, Delaware, Mississippi, North Dakota and South Dakota. I sure need those for my low-power WAS.

"I will QSL 100% and plan to send a picture of the station upon receiving their QSL. I will work anybody including generals. The frequencies here are: 7065, 7101, 7150, 7160, 7175 and 7178.

"Thank you and keep up the good work. 73, Dan."

Dan's letter can best be answered by working him and sending a QSL to Dan Lindsey, KØEVZ, 1101 Second Street, S.W., Mason City, Iowa.

Thank you Dan for the letter and good luck in your "project." I have a project of my own running and I would like to hear how yours turns out. I really think you get more enjoyment out of ham radio by trying for some specific goal such as this instead of just getting on the air to make a chance QSO. It is a challenge to work all states with low power when so many amateurs are unable to do it with their rockcrushers. Using more power than necessary is really not complying with the rules and regulations, but too many of us don't seem to care. Perhaps it might be a good idea to take an evening and read the rules and regulations again, it might save us some trouble.

My pet project is going along well. I finished 85 months of consecutive daily v.h.f. contacts, all above 50 mc. This turns out to be 2587 days. My first 50 mc contact was W5SFW, Amarillo, Texas after having listened for about 5 years.

Larry S. Kayser, VE3CEL (ex-VE4LK, VE5PU and VE8PQ), 187 Flora St., Ottawa, Ontario writes in part:

"Dear Walt: I have been reading your column in *CQ* and want to welcome you back, I appreciate the excellent job you are doing and will do.

"My last letter to you was published in the September 1956 *CQ* and then I was in school, trying to get on the air with nothing much and having very few contacts. Since then I have gone the limit from DX-20s to KWM-1 and the likes. Well now I am married and the budget is crimped as usual and homebrew equipment is the order of the day. I have gone through three calls and am now on my fourth. DX was once the passion, v.h.f. too had its day but now I feel that I have found real hamming. The receiver is a much modified "Novice Q-5er" which I still have, the transmitter is a 6AQ5-2E26 which will drive a pair of 809s when the power supply arrives from the west. S.s.b. will be used when funds for a unit become available.

"The mobile is just starting to take shape and it will operate on either 2 or 6 meters as local activity dictates.

"You may not notice anything new in the shack, but the big things are no commercial gear, no more frantic attempts to work this or that station, just plain sensible contacts, and playing around. There are lots of things for the future, (ham TV is one), a good mobile, a home station that can be used at a moment's notice. But over this will be the long pleasureable hours of tinkering, trying to get this or that circuit to work correctly.

"I work as a transmitter operator for CJOH-TV here now, am married with one boy. A lot to accomplish in less than six years, eh.

"For now, the best to you in your old position and may we meet soon on the air for a good QSO.

"I only hope commercialism won't hurt our wonderful hobby. I like to see the fellows build their own equipment, they make better operators. 73, Larry."

Thanks for the good wishes Larry, and thanks to the thirty-nine other fellows that wrote letters in the same line of thought. It makes me feel a little proud and at the same time a lot inadequate, I'll try as hard as I can not to let you fellows down, just don't let me down. "George" can't do it all, you know.

Everyone seems to have things under control this month and no one wants help. If *you* need help let me know, I have my hand out.

Don't let the summer weather keep you off the air. Put up a new antenna and get the equipment ready for next winter, you may not have the time then or it may be too cold. Try to be prepared for emergencies and be ready to go on the air at a moment's notice should power-lines go out or other emergency arise.

Well I have about used up my space for this month. I'll be seeing you from the same newsstand next month. Incidentally, why not subscribe and save having to hang around and wait for your copy? **73, Walt**

RTTY

BYRON H. KRETZMAN, W2JTP
431 WOODBURY ROAD,
HUNTINGTON, NEW YORK

RTTY Operating Frequencies

Nets centered on frequencies given; operation usually ± 10 kc.

80 meters	3620 kc
40 meters	7040 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.6 mc

Most radio amateurs invariably go through several phases; they try c.w. at first (*we hope!*), then a.m. fone, then s.s.b.; and, then perhaps radioteletype. Now, we are speaking primarily of *operating* phases. If, by some chance, we have developed some technical interest, and as the result gained some knowledge along the way, it is only natural that we get into RTTY. This is the last frontier of amateur radio, where there still is some challenge. This challenge is met by the requirement that we do a little *building*, in order to do a little operating.

"I can't afford to go into RTTY," is the lament we so often hear. No, most radio amateurs cannot; that is if they insist on *buying* all of their gear. Sure, the machine you have to buy, unless you can obtain one via MARS, but this needn't cost more than about $75. (Why buy a new one at $1,600?) If you have gone through most of the phases mentioned above you undoubtedly have that grand institution of ham radio called the "junkbox." The rest of the gear, in addition to the normal receiver and transmitter, required to get on RTTY can then come out of the junk box, except for a few unfamiliar low cost items such as toroids and polar relays.

RTTY The Hard Way . . . No. 12.

"I see you have Automatic Carriage Return on the Model 15 now . . ."

Operating

If in the past we have seemed to imply that the average RTTYer spends all of his time at the work bench, we are sorry. This is far from true. The knowledge, and fun, obtained by actual operation on the air is complementary to any time spent at the work bench. Here, RTTY operation splits into several facets, all highly interesting, not unlike that with other modes. You can handle traffic at 60 words-per-minute, you can rag-chew, or you can work DX. On v.h.f. you can do the same, with some fascinating technical sidelights, such as troposcatter f.s.k., and autostart, the automatic conrol of printers and tape reperforators at stations in the absence of the operator. Give it a try and see for yourself.

Twin City Tuning Eye

The receiving converter called the Twin City TU, described in Chapter 3 of the *New RTTY Handbook*, was designed for the beginner. When used on f.s.k. on the h.f. bands we recommend that a simple 'scope-type tuning indicator be built (Chapter 7, section 7.1). Since the publication of that book we have received many letters asking whether or not a tuning eye could be used as a tuning indicator. The answer is: yes, of course, if that's what is in your junk box.

So, this month's *Tidy Tidbit of Teleprinter Technology* is through the courtesy of Louie Davis, W5QQU of Hughes Springs, Texas. These tuning eye indicators, when connected to the Twin City TU as shown, permit a rapid check on the proper tuning of the receiver and will show up a tendency to drift before it goes far enough to cause errors to appear on the machine.

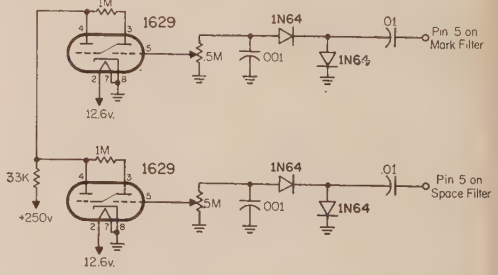


Fig 1—1629 Tuning Eye Circuit for the Twin City TU

Figure 1 shows the ingenious scheme of W5QQU that uses a pair of surplus 1629 tuning eyes (from Command sets), one for *mark* and the other for *space*. Mounted on the plug-in filter sockets are small diodes such as the 1N64, or others with a high back resistance,

used with .01 mf coupling and .001 mf filter capacitors in a voltage doubler circuit that provides negative output from each of the channel filters. Potentiometers are inserted in the control circuits to the tuning eyes to set the shadows at hairline-closure when the limiter is saturated and when each filter is resonant.

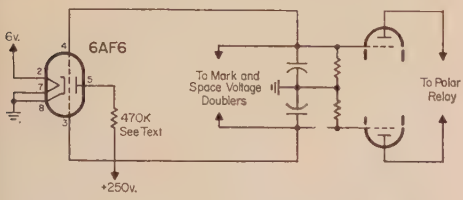


Fig. 2—6AF6 Double Input Tuning Eye Circuit

Figure 2 is the circuit used when a 6AF6 double-input eye is available. The 470 K ohm resistor to B-plus may be varied to vary the brilliance; however, more deflection is obtained with lower voltage, so vary this resistor until optimum brilliance and eye closure is obtained. The tube should be mounted so that the eye shadows are horizontal, with *mark* on the left and *space* on the right. Input to the filters can be balanced by equalizing both shadows.

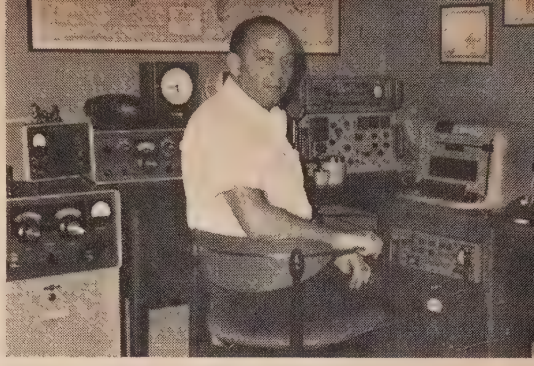
Dayton Hamvention

Unfortunately your RTTY Editor was unable to attend the Dayton (Ohio) Hamvention this year, *(first we have missed in 5 years, darn)* but Andy Henderson W8WYL, the Chairman of the RTTY Forum, reports an attendance of about 170 at the session. A hand survey showed that about 75% owned machines. Of these, about 50% were Model 15's, about 16% 26's, about 14% 14's, and about 5% each for 19's and 28's. There *must* have been some Model 12's, but no one would admit it!

The Model 15 donated by Ray Morrison W9GRW as a door prize was won by W8IRM of Cleveland. Additional prizes in the form of a copy of the *New RTTY Handbook* and 6 pairs of 88 mh toroids were also distributed. The three Forum speakers this year were Andy Henderson, W8WYL who talked on basic RTTY, Burt Jaffe, K9BRL who discussed s.s.b. exciters for RTTY, and Ken Netzley of Ohio Bell who related some experiences with 14, 15, and 19 machines, plus some adjustment shortcuts.

On the Bauds

W1LWV of Millinocket, Maine, is looking for one of those old pre-World War II dual diversity Hallicrafter receivers. John Meshna, 19 Allerton Street, Lynn, Mass., has for sale various small 600 ohm to 10,000 ohm (and up) transformers, ideal for TU's, a.f.s.k. oscillators, etc. Write him for a list. WA2CSE/2 at Cornell University is looking for W9UE's famous "Auto-Mate" automatic carriage return



K2GCP at Lawrence, Long Island, New York. Transmitter/Receiver: S-Line, General Coverage Receiver: AN/SRR-13, Converters: CV-57/URR, Machines: Kleinschmidt, Bands Operated: 80, 40, and 20, Operator: Leslie Mende, M.D.

and line feed adaptor for the Model 26. *(So are lots of others, Rich!)* The New York City RTTY Meeting, held March 26th, and MC'eed by W2PEE, turned up an attendence of 70, including notables Merrill Swan W6AEE and Phil Catona W2JAV, who demonstrated his latest developments in transistorized RTTY terminal equipment.

K4UMI of Grafton, Virginia, reports that A-2 is not dead yet on v.h.f. as he, K4DKC of Hampton, and W4JFH of Cape Charles are on 6 and 2 meters, looking for skeds. Dave can also work RTTY on 432 mc with 50 watts and a 56 element beam. W4AOI of Conicville, Virginia, is mostly on 80 meters evenings with his Model 19 and HT-32 driving a 4-1000A. K4ZQR of Louisville, Kentucky, has a Model 26 to work with his Twin City TU and 10B-BC-458. W4SKC of Miami, Florida, is planning a local 2 meter f.m. autostart net on 146.97 or 147.09 mc. K5AKY and his XYL K5DFT (Doll-From-Texas) reports 16 stations in the Houston, Texas, area active on A-2 a.f.s.k. on 6 meter autostart. They have started the Gulf Coast Traffic Net.

The Montana RTTY Certificate is the first RTTY award listed by K6BX in the April issue of the *Directory of Certificates*. This certificate is awarded through the efforts of K7BON, W7RZY, and W7MBV. K7DNN of Phoenix, Arizona, reports considerable A-2 activity in his area on 6 meters, including K7LPB, K7NOJ, W7KYE, K7ARR, W7FZY, W7GDK, K7GAT, and K7DNN. Some of these stations also work A-2 on 2 meters. W7NSU/K7NNG of Walla Walla, Washington, is building the Twin City TU to go with his Model 26.

KCM, Box 88, Milwaukee 13, Wisconsin, is offering two mylar capacitors, 0.068 mf for *mark* and 0.033 mf for *space*, with each order for five 88 mh toroids at $4, postpaid. The address of the Wisconsin Amateur Teleprinter Association is 5215 Morningside Drive, Greendale, Wisconsin. KØKBH of St. Paul, Minnesota, has gotten on the 52.6 mc Twin City

[*Continued on page 112*]

Space Communications

GEORGE JACOBS, W3ASK
11307 CLARA STREET,
SILVER SPRING, MARYLAND

THE OSCAR II package passed its final environmental tests with flying colors during early May, and has been delivered to its launching site in California. As these words are being written (the last week of May), OSCAR II rests in a powerful booster-rocket, ready to be launched into a polar orbit. If all goes according to plan, OSCAR II should roar into space during the first days of June, becoming amateur radio's second space satellite. It may all be history by the time this appears in print!

Like its predecessor, OSCAR II will transmit the Morse letters "HI" continuously on 145 mc., in the portion of the 2-meter band allocated internationally to radio amateurs on an exclusive basis. OSCAR II is expected to remain on the air for approximately three weeks, and in orbit for about two months. Radio amateurs throughout the world will be able to copy the HI signals, which should provide tracking and scientific information of considerable value.

Amateur radio is a hobby of communication, and the ultimate goal of the OSCAR program is to launch an advanced satellite that will both receive and retransmit amateur signals. OSCAR II is the second training-type beacon to be launched in preparation for such a repeater satellite. How soon this goal will be accomplished rests, for the most part, on the worldwide interest that will be demonstrated in the beacon experiments. Approximately 600 radio amateurs, s.w.l.s and other observers in all parts of the world reported receiving OSCAR I's signals. It is hoped that many times that number will participate actively in the OSCAR II program.

All radio amateurs (and other observers) who hear OSCAR II's signals on 145 mc. *are urged* to send a report on a QSL or a post card, giving the date and time of reception and the number of HIs counted in ten seconds. For reporting more elaborate data, such as signal strength, direction and duration of signal, fading effects, Doppler shift, etc., see the special reporting form appearing in last month's column.

OSCAR III

It's much too early to say anything definite about OSCAR III. Whether it will be another beacon transmitter (perhaps built by foreign radio amateurs and launched by the US), or a repeater satellite, won't be known until the results of OSCAR II are evaluated.

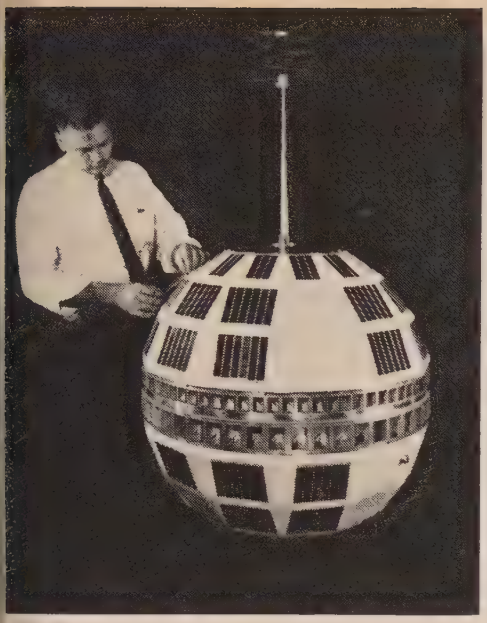
In February's column it was mentioned that the Project OSCAR Association had already drawn up preliminary plans for a repeater satellite which would be capable of relaying v.h.f. radio signals over vast distances. The column stated, as an example, that such a satellite would receive signals on the 6 meter amateur band and simultaneously retransmit them on 2 meters, serving a ground area of approximately 2000 miles in diameter. Radio amateurs were invited to submit other ideas for future OSCAR satellites to the Project OSCAR Association. In response to this invitation, the following interesting letter was received from Raphael Soifer, K2QBW. Ray should need no introduction to readers of this column, since he has been very active in radio amateur satellite communications and is director of MIT's office for Satellite Scatter Communications (OSSC).

"This letter is in response to the solicitation for comments appearing in George Jacob's February (*CQ*) column.

"As one who has long been identified with passive and quasi-passive techniques for amateur space communication, let me state at the outset that I consider the active satellite repeater, amateur radio's only realistic hope for genuinely useful space communications. . . . I likewise consider OSCAR I to have been a noble first step in that direction, one worthy of being followed by later and more ambitious ventures.

"It is in this last connection that I feel some concern that the plans voiced for comment in that February column may not be living up either to OSCAR I's precedent or to promoting amateur space communication to the best of our ability.

"Two of our amateur bands, those at 220 and 1215 mc (to my way of thinking, we lost 420 when the power limit was put on), are currently on the threshold of mass occupancy along the lines of 50 and 144 mc. The Gonset people are probably responsible for 220's being in that state, and the



Full-length view of the joint ATT and NASA TELSTAR experimental communication satellite which is expected to be launched during July. Solar cells make up most of the satellite's outer shell, and a band of dipole antennas used for receiving and retransmitting microwave signals girdle the payload's mid-section. A beacon transmitter will operate on 136.050 mc, using the erected helix and dipole antennas for tracking and telemetry purposes. In an elliptical orbit between 600 and 3000 miles high, TELSTAR will circle the earth every 2 hours and 40 minutes. One of the experiments to be demonstrated by TELSTAR is the first live television broadcasts between the United States and Europe. See December 1961's column for more details about the TELSTAR project. *(NASA Photo)*

combination of moonbounce, Sam Harris and the APX-6, for 1215. One or two good pushes would probably be enough to move one or both of these bands over the line, second-class citizens no more. This is why I feel that a decision to spot the receiver on an OSCAR repeater in the 50 mc band would be most unwise at this time. For it would be bucking the established trends of progress instead of helping them. Amateur radio's natural line of motion is upward. Why apply the powerful stimulus of an OSCAR repeater in the reverse direction? As OSSC's own experience would indicate, you cannot attract a low-band operator to six meters when all you can promise him is a 2000-mile contact; he can do the same on forty. Our experience here in the Boston area with OSCAR I was that it brought a lot of "retired" two meter men "out of the woodwork" as it were, but it did not make two meter men out of those without prior experience on the band, to any great extent.

"In any six- and two-meter OSCAR venture, the net effect would be to keep the six and two meter men where they are, instead of pushing them upward; in fact, some 220 and 420 mc men might be pushed down, at least temporarily. A far better approach, understanding the technical difficulty of of cross-band system, might be a two- and-220 mc job, encouraging those 144 mc men to make just one extra step higher, and moving the six meter men up to 144 in the same way. This would be using OSCAR to push progress forward, as I know we all want . . ."

This column heartily endorses Ray's philosophy, and the small participation in OSCAR I appears to prove his point. Although the successful launching of OSCAR I marked one of the highlights in the history of amateur radio, fewer than 600 of the world's 350,000 radio amateurs reported hearing the satellite!

As Ray points out, OSCAR I apparently did not bring much new blood to the 2 meter band. It is hoped that a much greater number of radio amateurs will participate in the OSCAR II program. It is also hoped that a solution will eventually be found for a frequency allocation problem that exists which does not make it possible to consider other than 6 and 2 meter operation for an OSCAR repeater satellite at the present time.

Frequency Allocation Problem

Only the 144-146 mc portion of the 2 meter band is allocated exclusively to radio amateurs on a world-wide basis. This is the type of allocation that is necessary if a repeater satellite is to receive and retransmit over great distances throughout the world, without interference. Although the 6 meter band is allocated exclusively to radio amateurs only in the western hemisphere and most of Asia, it probably could be used for a repeater satellite since several countries in Europe and Africa also permit operations in this band. The 220 and 420 mc. bands, however, are not allocated to amateurs on a world-wide basis, and they are shared with other services, even in this country. Because of interference that might be caused between a repeater satellite and the other services in these bands, and the general lack of world-wide radio amateur activity, serious thought has not been given to operate an OSCAR repeater in either the 220 or 420 mc bands. Perhaps strong world-wide participation in the OSCAR beacon experiments on 145 mc will provide the ammunition for eventually justifying an exclusive allocation in the 220 and 420 mc bands for radio amateurs on a world-wide basis!

Word just received from the Project OSCAR Association indicates that present plans call for the first OSCAR repeater satellite to receive and retransmit in the 2 meter band. This presents some extremely difficult technical problems in attempting to isolate the incoming and outgoing circuits, with a maximum bandwidth of only 4 mc available (144-148 mc). If you have any ideas or suggestions along these lines, the Project OSCAR Association will welcome them.

Remember, the OSCAR program is *your* program. If it is to continue to write new pages in the history of radio amateur communications, you must demonstrate your interest in it. If you copied OSCAR II's signal on 145 mc, be sure to send your report to the Project OSCAR Association, Box 183, Sunnyvale, California. All reports will be acknowledged with a special OSCAR II QSL card.

20 Mc Satellite Reception

As a result of the latest series of Russian Sputnik launchings there has been quite a bit of activity in the 20 mc space research band (19.990-20.010 mc).

Sputnik XI (also called COSMOS I), launched on March 16, has been received with a very strong signal on 20.003 mc. The signal consists of a 4 second "DAH", followed by a 1/10 second break, with the sequence repeated continuously. Sputnik XI circles the earth every 96 minutes.

Sputnik XII (COSMOS II), launched April 6, transmits slightly higher in frequency, on 20.005 mc. Although not as strong as Sputnik XI's signal, its transmissions have been received without difficulty on a small communications receiver, using a dipole antenna. Sputnik XII's signal consists of a 3 second "DAH" and a 1/5 second break between DAHS. The satellite has a period of 103 minutes.

Sputnik XIV (COSMOS V), launched on April 26, is transmitting on 19.995 mc, and makes a complete revolution around the earth in 91 minutes. The signals from each of these three Russian satellites are c.w. and require a b.f.o. for proper reception.

Also transmitting in the 20 mc space research band is the American satellite EXPLORER VII, launched October 13, 1959. Its signals are very weak, however, and are often very difficult to receive. EXPLORER VII circles the earth in 91 minutes.

Both the 19.990-20.010 mc and the 136-137 mc bands are among those allocated to space research at the 1959 Geneva Radio Conference. The Russians appear to favor the use of the 20 mc band, and at least one transmitter on each Russian satellite usually operates in this band. The United States, on the other hand, favors the 136 mc band, and at least one transmitter on all satellites to be launched by this country in the future will operate in this band.

During March, nearly 200 delegates from 28 nations attended a two-week conference on space communications held in Washington under the auspices of the International Radio Consultative Committee (CCIR) of the ITU. The meetings drafted preliminary technical standards for space communications which will be considered further at major international conferences planned for 1963. In the above photo, taken during the opening ceremonies of the meetings, from l. to r.: Beatrice Jacobs and her OM, CQ's Space Communications Editor, chat with Andrew G. Haley, prominent attorney on space matters, and Gerald C. Gross (W3GG/HB9IA), Secretary-General of the International Telecommunication Union.

Project West Ford

On Ocober 21, 1961, the United States launched into space a cylindrical canister containing 350 million tiny copper wires, each one 7/10 of an inch long and one-third as thick as a human hair (see SPACE COMMUNICATIONS, *CQ*, December, 1961).

The wires were to be released at an altitude of approximately 2100 miles to form a narrow u.h.f. radio-reflecting belt around the earth. The mechanism which was to eject the dipoles, however, apparently failed to operate properly, and the project was unsuccessful.

The Massachusetts Institute of Technology, in charge of the project, reported recently that it has traced the failure to a mechanical malfunction which caused the first can of copper "needles" to be ejected without the spin necessary to release the dipoles. As a result, the tiny wires clustered together in five or six small clumps that have been tracked for several months by u.h.f. radar.

MIT has developed a safety device to help prevent another failure when the next Project West Ford launch takes place, sometime before the end of this year. New telemetry equipment has been designed and will be placed in the canister to indicate the position, temperature, tumble rate and extent of dipole dispensing as well as the spin rate. This additional equipment will weigh 25 pounds, necessitating a reduction in the number of dipoles that will be launched from 350 to 250 million.

The belt of copper dipoles expected to be formed by the second West Ford launch will girdle the earth in a thin, narrow, circular ring at an altitude of about 2100 miles. If all goes according to plan, this man-made space belt should be capable of reflecting high power u.h.f. radio signals over vast distances. Theoretical calculations indicate that even the highest power microwave installations used by radio amateurs are on the order of 100 decibels *below* the minimum power level required for successful reflection from the belt. However, radio amateurs are known for doing the impossible, and a try on the 1296 mc band when Project West Ford is successful might bring interesting results.

73, George, W3ASK

YL

BY LOUISA B. SANDO, W5RZJ
4417 ELEVENTH ST., N.W.,
ALBUQUERQUE, N. M.

THE date and place of the National ARRL Convention should be familiar to all of you—Portland, Oregon, Labor Day weekend. Here are plans of special interest to LYLs and MYLs who will be attending. These are in addition to the regular convention activities.

Sat., Sept. 1—2 to 4:30 P.M.: Tour of Lloyd Shopping Center—a huge area of specialty stores; includes style show and tea; bus transportation from Coliseum 10 blocks away.

6-8 P.M.: YLRL Dinner and Forum; licensed YLs only; introductions, discussion, prizes.

9-12 P.M.: Dance (for all conventioneers).

Sun., Sept. 2—8-10 A.M.: Women's Breakfast; all LYLs and MYLs; Northwest theme and decorations; speaker on Northwest subject; gifts for all.

12:30-2:30 P.M.: Women's Luncheon; all LYLs and MYLs; talk on scenic Portland, followed by bus tour covering areas of the talk, such as Rose Test Gardens, Zoo, Science Museum.

6-7 P.M.: Women's Dinner; all LYLs and MYLs; Japanese flower arranging; gifts and prizes.

Mon., Sept. 3—8-10 A.M.: Women's Breakfast; all LYLs and MYLs; SWOOP initiation.

Pre-registration deadline is July 15. Registration to that date is $4.75; after that, $5.75. (Non-ham $2.75) Address registrations to: ARRL National Convention, Box 1335, Portland 7, Ore. Members of the Portland Roses are working very hard to provide a tremendous time for all gals who attend.

W4BLR, Kay Anderson, placed second on c.w. in the '62 YL-OM Contest. Licensed in '53, she holds CPC-30, and is a former YLRL president ('59). Kay and OM W4BVB have 5 jr. ops ages 14 to 3. With a move to Huntington, W. Va. in July Kay will soon be on with an 8 call.

1962 YL-OM Contest Results

Congratulations to the top scorers in the 13th Annual YL-OM Contest! In the phone section, held Feb. 24-25, top YL score was earned by KØEPE, Martha Wessel (Marte placed 3rd in '61—see photo/write-up *CQ* July '61, p. 100). KP4CL, Alicia Rodriguez, placed second. W5DRI, Dena Morgan, was third high (2nd in '61, 1st in '60, '59 and '58—see photo/write-up *CQ* July '61, p. 102).

K5MDX, David Thompson, earned high score on phone for OMs. W4SVJ, Richard Brandt, made second (2nd in '61), and K4JIG, William Egbert, came in third (3rd in '61).

In the c.w. section, held March 10-11, first place among the YLs was earned by KØIKL, Joyce Polley (Joy placed 3rd in '61, 1st in '60—See photo/write-up *CQ* March '61, p. 95). W4BLR, Kay Anderson, came in second (1st in '56), and W1RLQ, Grace "Chata" Swenson, was third high.

Among the OM's W4SVJ, Richard Brandt, was first on c.w. (also 2nd on phone this year and '61); W5WZQ, David Blaschke, was second (1st in '61); K2EIU/2, Kenneth Keeler, made third (2nd in '60 and '61).

KØIKL, W5WZQ, KØEPE and K5MDX will receive cups for their top scores. Highest scorer in each district and country will receive a certificate.

K2JYZ, Lil, YLRL V.P., received some 350 contest logs, which OM K2JYM helped her check. Their jr. YL, K2ZUX, lettered all of the certificates.

1962 YL/OM Contest Winners

	Contacts	Sections	Score
YL CW			
KØIKL, Joyce Polley*	411	65	33,394
W4BLR, Kay Anderson*	371	67	31,071
W1RLQ, Grace Swenson*	323	76	30,685
OM CW			
W4SVJ, Richard Brandt*	80	47	4,700
W5WZQ, David Blaschke*	80	41	4,100
K2EIU/2, Kenneth Keeler*	65	37	3,006
YL PHONE			
KØEPE, Martha Wessel	721	82	59,122
KP4CL, Alicia Rodriguez	543	106	57,558
W5DRI, Dena Morgan*	518	81	52,448
OM PHONE			
K5MDX, David Thompson*	99	45	5,569
W4SVJ, Richard Brandt*	78	46	4,485
K4JIG, William Egbert*	73	41	3,741

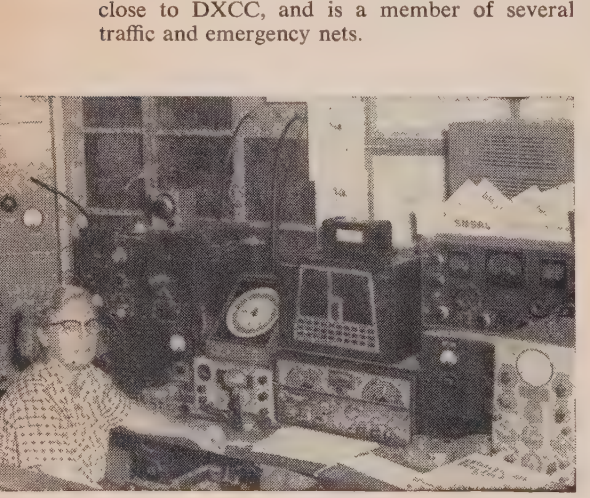
**Low-power multiplier.*

KP4CL, Alicia Rodriguez, earned second high phone score in the YL-OM Contest. Alicia has been very active on 14 mc since going on s.s.b. last Aug. She holds DXCC-SSB, DXCC-phone, A1-Op, YLCC, WASWA, WAC, WAS, WBE, Public Service Award, CHC. Licensed in '37, Alicia has been secretary and four times president of Puerto Rico ARC. Her OM is KP4CK.

W4BWR

W4BWR, Ruth Nissen, of Melbourne, Fla., is an LYL who enjoys all modes of operation on all bands—3 to 400 mc—RTTY, s.s.b., a.m. and c.w. Not only that, but she likes to build gear for it as well! Ruth came up with her General in 1953 and although her OM was not a Ham, Ruth says he bought her such items as an SX-100 for an anniversary present and HT-32 for Christmas. Ruth has two boys, one of whom is W4ZBA, an electronics technician at Boeing. Ruth is now a widow and owns and manages a taxicab company at Cocoa Beach.

W4BWR is a member of the Missile ARC; helped organize the Brevard ARS; is in AREC, RACES, MARS, E.C. for S. Brevard Co. for several years; radio officer in Melbourne area for Civil Defense; member of Floridoras (former president and net mgr.); and has served as asst. director of SE Division. She holds 48 certificates, among them CHC, RCC, YLCC, WAS, WAC, WAS/YL, WAC/YL, DUF, WBE, close to DXCC, and is a member of several traffic and emergency nets.



W4BWR, Ruth Nissen, not only operates all modes and all bands, 3 to 400 mc., but she likes to build her gear as well.

Amateur Radio Week in Mass.

The first week of April was proclaimed Amateur Radio Week in Massachusetts by that state's governor. To better publicize ham radio the Framingham Radio Club set up a station in a showcase in the center of the mall at the Shopper's World in Framingham. Using the Call W1GLA, they operated from Mon. through Sat. on 75, 20, 15, 10, 6 and 2 meters. YLs K1EKO, K1IZT and W1ZEN with the help of a couple of high school boys handled the day time operation, while OMs of the club carried the night load. Some 340 contacts with 22 states and 7 countries were had. Onie adds that the 14 × 4½ ft. glass showcase was high enough so that she was the only one of the gals who could stand up straight—and that it was "just like being in a goldfish bowl!"

YLRL Calendar

Howdy Days—Start Sept. 25, 1962, 1200 EST; end Sept. 27, 1962, 1200 EST.

YLRL Anniversary Party—C.W.: Oct. 24-25, 1962. Phone: Nov. 7-8, 1962. Full rules will be published later; at this time K2JYZ says they will remain the same as for the 1961 contest.

Ladies Day—2nd Monday of each month; any and all bands; look for old friends and make new ones.

CQ YL Supplement

As we have mentioned before, you can get

[*Continued on page 116*]

NOW . . . PROOF OF DX PERFORMANCE

IS K6INI THE WORLD'S CHAMPION DX OPERATOR?

Judge for yourself! Read his letter and count the DX he has worked—with only 65 watts and a $16.95 Gotham V-80 Vertical Antenna.

2405 Bowditch, Berkeley 4, California
January 31, 1959

GOTHAM
1805 Purdy Avenue
Miami Beach 39, Florida
Gentlemen:

I just thought I would drop you a line and let you know how pleased I am with your V-80 vertical antenna. I have been using it for almost two years now, and am positively amazed at its performance with my QRP 65 watts input! Let me show you what I mean:

I have worked over 100 countries and have received very fine reports from many DX stations, including 599 reports from every continent except Europe (589)! I have also worked enough stations for my WAC, WAS, WAJAD and ADXC awards, and I am in the process of working for several other awards. And all this with your GOTHAM V-80 vertical antenna!

Frankly, I fail to see how anyone could ask for better performance with such low power, limited space and a limited budget. In my opinion, the V-80 beats them all in its class.

I am enclosing a list of DX countries I have worked to give you an idea of what I have been talking about.

Wishing you the best for 1959, I am

Sincerely yours,
Thomas G. Gabbert, K6INI (Ex-TI2TG)

V-80 VERTICAL ANTENNA FACTS

- If K6INI can do it, so can you
- Absolutely no guying needed.
- Radials not required.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- Uses one 52 ohm coax line.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Four metal mounting straps furnished.
- Special B & W loading coil
- Non-corrosive aluminum used exclusively.
- Omnidirectional radiation.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.

DO YOU KNOW

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2. LOADING COIL NOT REQUIRED ON 6, 10, 15 AND 20 METERS. FOR 40, 80, AND 160 METERS, LOADING COIL TAPS ARE CHANGED MANUALLY EXCEPT IF A WIDE-RANGE PI-NETWORK OUTPUT OR AN ANTENNA TUNER IS USED; IN THIS CASE BAND CHANGING CAN BE DONE FROM THE SHACK.
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For further information, check number 44, on page 126

Vertical Beam [*from page 54*]

Results

The theoretical gain of this antenna is 5 db over a dipole with the additional advantage of a null in the back to reduce QRM. However, it has a very low angle of radiation which gives it a further advantage over a horizontal dipole for DX work. In fact, comparison tests made between my ninety watts to the beam and a local station running a kilowatt to a dipole, with stations in the favored direction of his dipole, indicate that our signal strengths are about equal at distances greater than 1000 miles. This would indicate that for DX work one could expect a 10 db improvement in signal strength over a horizontal dipole.

On receiving, those "locals" in the 300-700 mile range no longer have such ear-shattering signal strengths, and the QRN from distant electrical storms is noticeably reduced.

Using this beam, I have had no difficulty working WAC on 40 meter c.w., and Australian and New Zealander stations can be worked, at will, in the early morning hours up until about 7:00 A.M. local time. ■

DX [*from page 69*]

DX contest. W4KVX gave a talk along with a photographic tour of the production of his *DX Magazine*. Those of you who do not subscribe to Don's weekly DX bulletin do not know what you are missing. I would suggest that you drop Don a note and ask him for a sample copy.

Last but not least on the DX program was K6BX, Clif Evans, of CHC fame. I am sure Clif will go into more detail of his Dayton observations in his column. The first USA-CA certificates were presented by our infamous Editor at the main banquet. The main speaker at the banquet was WØTSN, former president of ARRL.

The above is only a short outline of the happenings at the Dayton Hamvention. Space as well as discretion does not permit more elaboration of the formal and informal proceedings at the Convention, however, as I have said many times before, if it is at all possible to make it, we will be looking for you next year.

QSLs and QTHs

The following is a quote from a letter from Bill, VE7ZM, thanks to the Western Washington DX Association.

"I am *not* QSL manager for the Soviet boys, but act only as distributor for the cards they send me. So far, *all* cards from the following have been sent to me and have gone out to those who have sent envelopes. (Many are still on hand unclaimed and due to so many errors which only I can get corrected, will remain here until claimed.):

UA3FE/UAØ & UAØKYA (s.s.b. only-Zone 23); UA3AT/UAØ, UAØBP/UAØ, UO5PK, UQ2AN/UG6, UQ2AN/UD6, UH8DA, UG6-KAA (s.s.b.), UA2AO, UM8KAA (s.s.b.).

"I will receive all cards from UA3CR/UA1: UAØKAR (s.s.b. only) and UA3CR/UAØ. A few cards have been received from UAØBP (Zone 18); and UF6FB. If anyone sends an envelope and I do *not* return it at once, it means there is either no card here or a wrong one is here and the only way I can correct it is to apply to Moscow for it and this takes time.

"I am QSL Manager for the following and have logs for all on hand through March 15th, 1962. ZB1A, TA3GI, HP9FC/VQ8, HS2A; VK8OW, KH6EDY (Op. Jim Hunt) and KC6CG."

With the difficulty of obtaining cards from some of the "U" stations, it certainly is a lot of work on Bill's part. A very nice pat on the back was given Bill, VE7ZM and Bill W7PHO by Leo, UA3CR in a fine article concerning s.s.b. in the Soviet Union in a recent issue of the *Sidebander*.

W8MXY was an operator at the XU6GRL in 1946-47 and can assist in QSLs if anyone still requires a card.

SM5AIO is handling the QSLs for the late SM5BUG/9Q5.

The following is from GW2DUR's QSL manager, George KØRDP: "I am now QSL manager for GW2DUR. Two batches of logs have been received from him, including only those specific and recent requests for QSLs. To prevent confusion, I'll repeat that logs I now have from Noel include only those contacts making recent request for a card, in spite of the fact that the contact may have been an old one. The Logs include contacts made as far back as 1948, but (again) only include contacts for which recent requests for cards has been made. I guess I have the point across now.

"Since the logs now on hand include some well over 400 requests, some cooperation would be very much appreciated. If anyone, DX or W/K, VE have worked GW2DUR in the period preceding April 1, 1962, back to 1948, and have made a recent request for a QSL directly to GW2DUR, they are probably on the logs I have. If these stations would kindly send s.a.s.e. it would substantially lighten my work load. If the boys sending in s.a.s.e. are not on my log copies, I'll forward their request to Noel and they will subsequently receive a card. In any case, s.a.s.e. or not, all stations on the logs now on hand will eventually receive a card but help would be appreciated."

73, Urb, W2DEC

QTH and QSL Managers

BY1PK Box 427, Peking, China.
CP5EZ Box 930, Cochabamba, Bolivia.
DU1EH 638 D. Santiago, Sampaloc, Manila, Philippines.
EA8BA via W4MXL
EL5E Larry Hendricks, c/o Assembly of God Mission, Cape Palmas, Liberia.
EL6E via VE4CX
ex-EP2BK Bob Snyder, Box 502, Springfield, Missouri.
FB8YY via F9AH
FK8AX H. Lesuer, B. P. 541, Noumea, New Caledonia.
FW8AS VK/ZL via VK3-AHO others via W4ANE.

[*Continued on page 110*]

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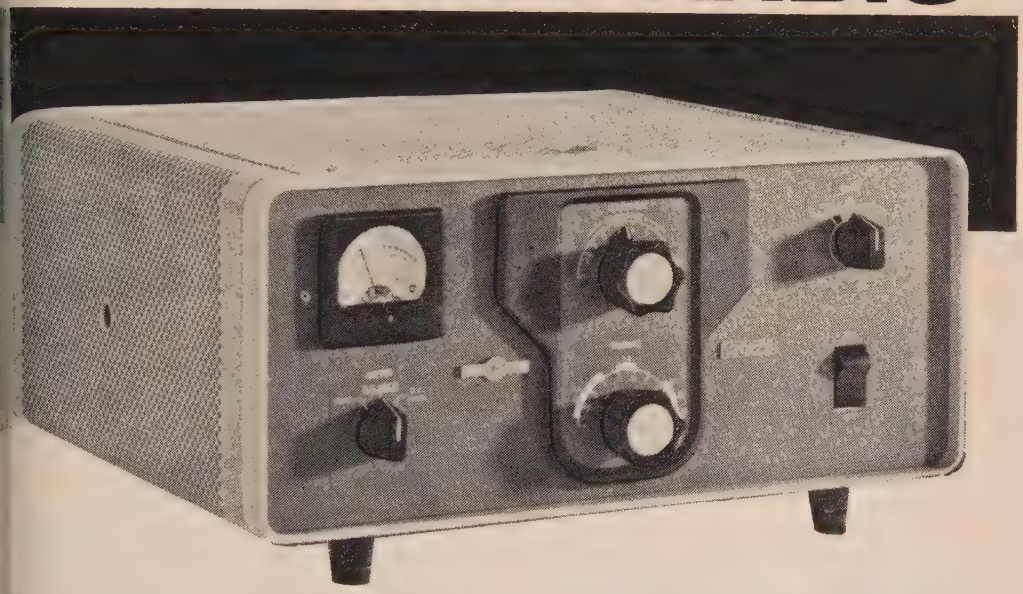

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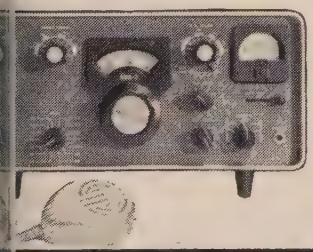

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For further information, check number 45, on page 126

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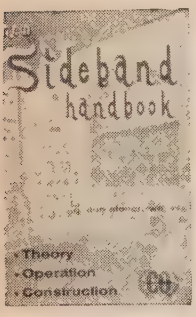

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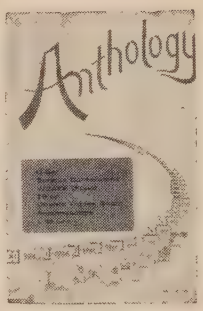

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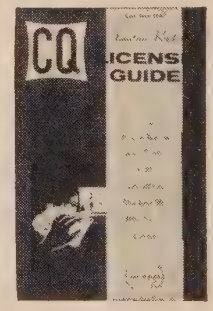

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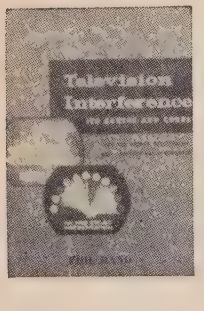

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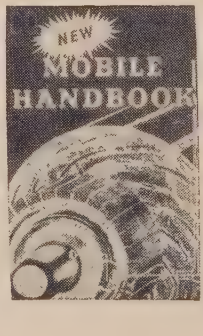

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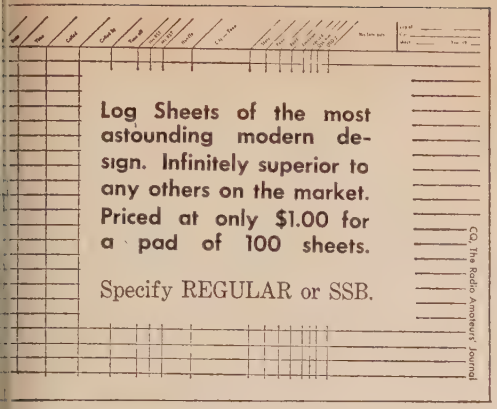

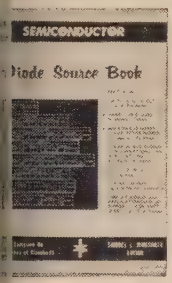

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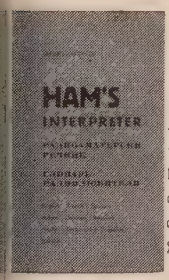

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DX [*from page 106*]

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VS4RM Robbin Maule, Tanjong Lobang Scholl, Mari, Sarawak.
VS6AE via W6DIX.
VS9APH via W3HQO.
VU2JA via W2CTN.
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WØMLY/TR8 via KV4AA
XZ2SY via W4ANE.
ZB2AD via W3AYD.
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ZD8JP John Packer, c/o Cable & Wireless, Ascencion Island, GMRD, Box 4187, Patrick AFB, Fla.
ZK1AR via K4LRA.
ZK1BS via W7ZAS.
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5A1TW Gene Walsh, Box 4154, APO 231, c/o PM N.Y., N.Y.
5A3BC via K2PFC
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5U7AC via W9RKP.
6W8AN Box 971, St. Louis, Republic du Senegal.
6W8DE Box 3033, Dakar, Senegal.
9K2AG POB 12, Kuwait, Persian Gulf.
9K2AM via W3KVQ.

USA-CA [*from page 74*]

USA-CA County Identity

We recommend use of the Post Office Department Publication #26 for county identity as this publication is revised annually in July. We understand that USA-CA caused a heavy demand for POD #26 and they ran out of copies in April; however they should be available again this month. As an alternate we recommend you obtain a Rand McNally Road Atlas for the U.S. and Canada, 38th Edition, which sells for $1.95 in any book or office supply store.

Sad Sack S.W.L. QSL Situation

We repeat, only in the United States, among civilized nations, is the s.w.l. banned like an unwanted outcast from a hamdom fraternity of which he is fully entitled to recognition of membership in some capacity. As a consequence, s.w.l.s have had little opportunity to organize, get news coverage, or to enjoy even the *limited* QSL Bureau services available to U.S. hams.

As far as we can find out, s.w.l.s in the U.S. have only the facilities of a s.w.l. QSL Bureau service offered by one man, Le Roy Waite, who offers to forward s.w.l. QSLs received from DX stations providing U.S. s.w.l.s register with him and provide the usual s.a.s.e. for return of cards. Le Roy writes that many DX SWL stations send cards giving only WPE calls and without full QTH of addressee. He also reports that many such cards are being held because U.S. s.w.l.s have failed to register their calls with him and/or provide s.a.s.e. It is suggested that all U.S. s.w.l.s expecting cards from DX stations, file with Le Roy Waite, WPE2AK, 39 Hannum Spa, New York.

While we commend Le Roy for his selfless s.w.l. service, we must protest the crying shame we in the U.S. are almost completely alone among 'matured' nations in denying some national level QSL Bureau service to s.w.l.ers. We re-emphasize, U.S. hamdom urgently needs the hundreds of thousands of s.w.l.s on our fraternal and political team. We very shortly will need the s.w.l.ers mass opinion and vote when over a million CBers start clammering for a greater share of our allocated frequencies. The die is cast. Our League could provide no better leadership at this time than taking immediate steps to rectify past invalid and illogical policy which rejected s.w.l. right to recognition within our fraternity.

The Growing QSL Problem

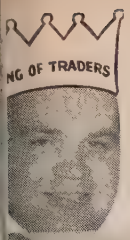
It is a fact that every year will see hamdom's ranks substantially increased. QSLing is an integral part of our normal hobby function. It may be true that here and there some ham has little interest in QSLs; however, such folks are few and far between and should be ignored in our planning.

At the present time U.S. hams are needlessly pouring tens of thousands of dollars in postage down the proverbial rat hole. We say needlessly because if we had some national level organization that really had hamdom's interests at heart, here is a basic need long overdue for remedy. It is a fact that one can send eight to eleven QSL cards in a single envelope for the postage it requires for just one. What does this suggest? Obviously . . . a QSL Bureau service within the United States at the state level for exchange of cards within the U.S. Why not? Even A.R.R.L. could provide such service if service was their policy! If they have hundreds of thousands of dollars to spend for new buildings . . . then what are these buildings for if not to house more 'administrators' to provide better services?

The organization of such intra-U.S. QSL Bureaus could be separate from the DX Bureaus now existing. With minimum leadership and administrative effort at national level, such bureaus could be maintained with ease thereby saving all of us several times our League membership dues annually.

While we are on the subject of QSLs and lack of national-level service for U.S. hams . . . are you aware that we here in the U.S. presently are denied a national-level organization willing to take our QSL cards and certify proof of their possession so that we may apply to other nations for awards without the needless expense and risk of sending priceless cards all over the world? All other major nations provide this service to their nationals but our League so far has refused such service to the end that we, again, pour tens of thousands of our hard earned dollars down a stupid rat hole.

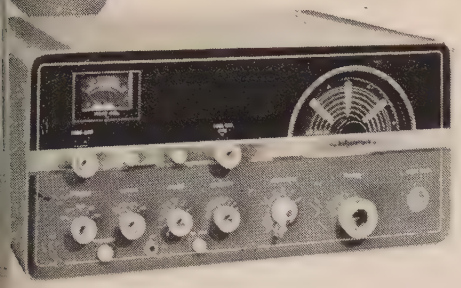
Most other nations would like an agreement with our League for a system of inter-nation certification which could be extended down to affiliated clubs. Can you think of any valid reason why our League should not give this service when most other nations think it rather stupid that their nationals are forced to spend needless monies sending their cards overseas?



Terry (W9DIA) "King of Traders"

Guarantees You the Best Deal on

Hallicrafters Gear



Only $5 Down

Take Up to 3 Years to Pay

:lp! Help! Truckload HT 37's just came in we're overstocked!

re trading extra high on the HT You'll never buy it better than t now!

LICRAFTERS RECONDITIONED EQUIPMENT—10% DOWN

t: Rcvr	$ 29	S-77 Rcvr	49
c: Rcvr	39	SX-100 Rcvr	189
Rcvr	49	SX-101 Early	219
Rcvr	67	SX-101 Mark IA	229
Rcvr	109	SX-101 Mark III	249
10 Rcvr	129	S-102 Rcvr	29
I Rcvr	179	S-106 Rcvr	29
2A Rcvr	269	HT-40 Transm.	64
Rcvr	49	HT-18 VFO	29
Rcvr	59	HT-30 SSB Exciter	199
Rcvr	99	Same as above but in Home Brew cabinet	169
Rcvr	54		
Rcvr	64		
Rcvr as is	99		
Rcvr	49	HT-31 Linear	129
Rcvr	159	HT-32 Exciter	369
Rcvr	119	HT32A Exciter	429
Rcvr	79	HT-33A Linear	449

E FOR OUR LATEST LISTING. 10% N—up to one year to pay on $60.00 two years on $120.00 order and years on $180.00 order—$5.00 de- to hold—Subject to Prior Sale.

In Stock — Immediate Delivery

	Price	Monthly Payments
S-38E Rcvr	$ 59.95	$ 1.98
SX-62A Rcvr	359.00	14.08
S-94 Rcvr	69.95	2.35
S-95 Rcvr	69.95	2.35
SX-100 Rcvr	325.00	11.56
SX-101A Rcvr	445.00	15.89
S-107 Rcvr	94.95	3.25
S-108 Rcvr	139.95	4.87
SX-110 Rcvr	169.95	5.96
SX-111 Rcvr	279.50	9.91
*SX-115 Rcvr	599.95	21.48
S-120 Rcvr	69.95	2.35
SX-140 Rcvr	124.95	4.33
SX-140K Rcvr	104.95	3.61
SR-34AC Transcvr	395.00	14.08
R-47 Spkr	12.95	.29
R-48 Spkr	19.95	.54
HT-32B Xmtr	725.00	26.00
HT-33B Xmtr	995.00	35.75
*HT-37 Xmtr	495.00	17.69
HT-40 Xmtr	109.95	3.79
HT-40K Xmtr	89.95	3.07
HA-4 Keyer	59.95	1.98
HA-2 2-Meter Transvtr	349.50	12.44
HA-6 6-Meter Transvtr	349 50	12.44
P-26 Sup for above	99.50	3.41
FPM-200 Mob. Transcvr	1995.00	71.86
HT-41 KW Lin	395.00	14.08
S-119 SWL Rcvr	49.95	1.62
S-119K Kit	39.95	1.26
CB-3 C.B. Transcvr	149.95	5.23
CB-4 C.B. Hand Held	89.95	3.06

Terms above apply to three year contract. Minimum order financed for 1 year, $60; 2 years, $120; 3 years, $180. Persons signing time pay contracts must be 21 or over and employed.

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Get our terrific allowances. Use coupon.

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3832 Lisbon Avenue
Phone: WEst 3-3262

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CHICAGO, ILLINOIS
6450 Milwaukee Avenue
Phone: ROdney 3-1030

Amateur Electronic Supply—Mail Order Dept. C-73
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Ship me .....
I enclose .....: I will pay the balance in

☐ 1 year ☐ 2 years ☐ 3 years

I want to buy ..... and want to trade
..... What's your deal?

Name .....

Address .....

City ..... State.....

☐ Send reconditioned equipment and Pre-inventory sale bulletin

For further information, check number 46, on page 126

What's Cooking?

Gosh, been RCCing and almost forgot that Bloke Editor in New York keeps telling me that ad space pays for publishing the rag and all our several pages are costing hard earned dough, so better turn down the burner 'til next month.

Oh yes, got a letter from a publisher just today . . . says he's much interested in providing hamdom an inexpensive QSL card. Keep your fingers crossed . . . think we've got it in the bag now!

One last flash . . . new award coming out sponsored by hamdom's 'clown' . . . he's going all out to do away with all other awards except his and the way he figures on doing it is to convince you that only QSOs that last over a half hour have any 'value.' . . . Good Lord, may we never see the day on these crowded bands when everyone clobbers a frequency for thirty or more minutes without stopping or sharing the frequency with others . . . takes all kinds, and hamdom is entitled to at least one clown and the deep belly laughs he frequently generates with his offbeat antics. Trouble is, this joker now is dead serious; and aspires to become accepted as an intelligent journalist.

Keep sending us hot scoops, pictures and what not. If it is real good, we put it on top of the heap . . . and remember, pictures, even of awards and awards presentations often have more interest than cold, clammy words. Believe me, it is a deep pleasure serving all you wonderful folks, especially those that write such nice letters . . . be back with you in August.

The OLD MAN, K6BX

Sideband [*from page 91*]

Apparently, I have wandered far afield, but the above remarks will lead to a better understanding. Many of the gurgles, squawks, yoops and squeals that you have to put up with in addition to the buckshot, when a local friend comes on the air—are generated in your own receiver! The signal at the antenna post is strong enough to overload the grid of your first r.f. Stage and then you get these strange noises.

Now, if you can *cut down* the input to the first r.f. tube grid to a point where it does not overload, you will also reduce these unwanted signals. Unfortunately the r.f. gain potentiometer comes into the circuit in most receivers at a point beyond the first grid so no matter how much your gain is turned down you do not cut the voltage input of the first grid—which is where it should be done. The device described below is not a new invention; it is a simple *L* pad made up of two ordinary carbon resistors and it is inserted in the circuit in a place where it will do the most good—between the antenna and the first r.f. stage.

It can be thrown out of the circuit by a flick of the toggle switch but once you get used to it you'll probably leave it in circuit unless you are receiving a very weak signal. Here at OA4J, I usually leave it in because I can never tell when one of my close by 1 kw neighbors may break me when I have the r.f. gain way up for a weak one. I don't like to get blasted out of my chair! Its use has also replaced the IFNL I had previously used to cut down ignition noise. It does not take out the ignition noise entirely but it does chop off the peaks so I can usually keep on with a QSO without drawing a complete blank.

The cost to build the attenuator is less than $2.00 with the likely chance that it will cost you nothing if you have the parts in your junk box. A small box of the "mini" type is required as is one d.p.d.t. switch preferably of the toggle type and two run-of-the-mill ¼ or ½ watt resistors which can be 20 percenters. They do not have to be precision types. With the switch thrown one way, the attenuator is entirely out of the circuit and the receiver operates directly from the antenna; in the other direction, the switch inserts the resistors between the antenna and the receiver.

The values indicated will give you *approximately* 10 db insertion loss. Don't be afraid of 10 db loss. You can compensate if and when necessary by turning up your r.f. gain and you still will not block your first r.f. grid as that is being taken care of ahead of the first tube. Some of you may, after playing around with this little pad, wish to increase attenuation. You can increase it another 10 db by replacing the 470 ohm resistor with one of 4700 ohms. Or you can get an additional switch and two more resistors and make it a two step tandem pad giving you either 10 or 20 decibels of insertion loss by throwing a single switch or both of them together. I have even built one with three switches giving me a greater combination of values, but I don't think it will be necessary in this use to exceed 20 db loss. You can establish the insertion loss in S units on your receiver by tuning in a constant carrier which reads well up on the meter, preferably around S9 where the meter is probably most accurate, and taking a reading with the "Pad" switched in. The difference between the two readings is naturally the insertion loss of the pad. I have specified 47 and 470 ohms; naturally 50 or 51 and 500 or 510 ohms will work equally as well. These values are suited to the average 52 ohm input impedance of the ham antenna and the 52 ohms of the receiver. It will work even if the receiver has a higher impedance, but the attenuation will be slightly less in such cases. Try it.

Shield the pad thoroughly; that's why I specified the metal box. Use co-axial RG-58 or -59 cable and ground the outer shield to the box to prevent leakage of incoming signals *around* the pad.

Thanks Uda and that does it for this month.

73, Dorothy & Irv.

RTTY [*from page 97*]

FM Net. WØPEV, also of St. Paul, is building a transistorized TU. K9DOF of Elkhart, Indiana, reports W9WNB, W9FSA, and W9ZFA all active on 52.6 mc f.m. Two Meter f.m. operation on 147.24 mc is also forthcoming. VE3BHQ of Newcastle, Ontario, is building a W2JAV transistorized TU.

Comments

Frequently we get letters from fellows asking if a certain strangely-numbered machine should be purchased. Upon investigation it usually turns out that it is an old machine made for Western Union. These machines were set up for a 7-unit code with the stop pulse the same length as the code and start pulses, (instead of the 7.42-unit code) resulting in a slightly higher speed of operation, namely 65 words-per-minute, or 390 operations per minute instead of 368. What does all this mean? It means that you can copy our normal 60 w.p.m. speed by careful range adjustment, but if you use this odd-ball tape transmitting equipment the fellows on the other end will have trouble because it sends a little too fast.

For more details on these speed differences, refer to Chapter 2, section 2.1d of the *New RTTY Handbook*. We again suggest you stick to the machines made by the Teletype Corporation, such as Models 14, 15, 19, 26, and 28. Another thing, equally important we think, is that replacement parts are in abundant supply for these machines.

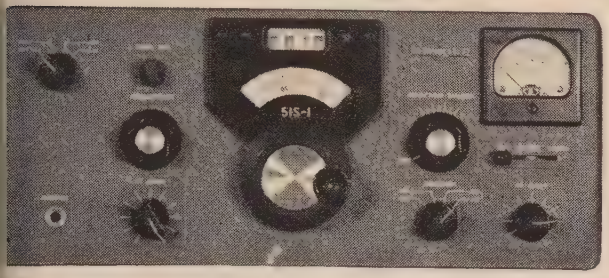
73, Byron, W2JTP

See Terry (W9DIA) for Your Best Deal on COLLINS!

Big Inventory Sale! TERRIFIC TRADES!

$5.00 DOWN ...UP TO 3 YEARS TO PAY

NOW MAKING DELIVERY ON NEW 75S 3 RECEIVER



UT the 51S-1 in YOUR SHACK only $5 DOWN

Bargains in Collins Reconditioned Gear

A1 Receiver	$229
A2 Receiver	279
A3 Receiver	379
Cycle filter for 73A3	39
A4 Ser. #0-1500	495
A4 Ser. #1500-3000	525
A4 Ser. #3000-4500	550
A4 Ser. #4500-6000	595
7A1 Transmitter	179
7A2 Transmitter	219
KWS-1 Ser. #689	850
KWS-1 Ser. #895	875
KWS-1 Ser. #9239	900
KWM-1 Sproher console 516F1	
AC Supply for KWM-1	69
D1 Mobile Mount for KWM1	29
136A1 Noise Blanke	49
312B4 Station console	149
30S1 Linear amplifier	995
516E1 DC Suply for KWM-1/KWM-2	149
75S1 Receivers	369
75S1/500 cycle filter	399
75S1/500 cycle filter/Q Multiplier	419
KWM-2 Transceiver	850
KWM-2/Morse Blender	895
351D2 Mobile Mount for KWM-2	69
F455J60 75A4 Filter	34
353C31 75A1 Filter	29

LOOK AT THESE LOW MONTHLY PAYMENTS AFTER LOW $5 DOWN PAYMENT

WRITE FOR LATEST LISTING: 10% DOWN!

to one year to pay on $60 order, two years to pay on $120 order, three rs on $180 sale. $5 deposit holds your selection.

ADES ACCEPTED ON ALL NEW OR RECONDITIONED GEAR — E COUPON

Look at these low monthly payments after low $5 Down Payment . . .

30L-1 Linear Amplifier	$520.00	$18.59
30S-1 Linear Amplifier	1556.00	56.00
75S-3 Receiver	680.00	24.35
51J-4 Receiver	1464.00	52.69
51S-1 Receiver	1828.00	65.83
KWM-2 Transceiver	1150.00	41.35
DL-1 Dummy Load	58.00	1.91
351D-2 Mobile Mount (KWM-2)	120.00	4.15
CC-2 Carrying Case	85.00	2.88
MP-1 15V DC Power Supply	198.00	7.10
PM-2 Portable Power Supply	150.00	5.24
516F-2 AC Power Supply (32S/KWM-2)	115.00	3.97
321B-3 Speaker (S-Line)	32.00	.97
312B-4 Speaker Console (S-Line, KWM-2)	195.00	7.00
312B-5 PTO Console (KWM-2)	350.00	12.45
399C-1 PTO Speaker	164.00	1.99
F455Q-5 Mechanical Filter (75S)	52.00	1.70
302C-3 Directional Wattmeter	130.00	4.51
189A-2 Phone Patch	67.00	2.10
440E-1 Cable (516E-1 to KWM-2)	17.00	.43
136B-2 Noise Blanker (KWM-2)	124.00	4.30

Above are shown for a 3 year contract. Minimum order that can be financed for one year is $60, two years $120, three years $180. Persons signing time pay contracts must be 21 or over and employed.

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Ship me .....
I enclose .....: I will pay the balance in

☐ 1 year ☐ 2 years ☐ 3 years

I want to buy ..... and want to trade
..... What's your deal?

Name .....

Address .....

City .....State.....

☐ Send reconditioned equipment bulletin

For further information, check number 47, on page 126

KG1CC [*from page 57*]

Station. Then, as our QSL cards got in the mail, requests for these cards began increasing.

The long winter months at Camp Century were shortened considerably by phone patches. We received notices of birth, death, and were able to keep homes from breaking up, as well as receiving "Dear John", type patches. The morale was visibly increased for the 96 men spending the winter. Capt. Cahill commented that you could tell which men had had a phone patch home, just from the expression on his face.

The "ham station" became the talk of the camp. The carpenters moved in, putting a ceiling in, (the only room in camp with a ceiling), boxed in our water tank, (used for fire protection system) and painted the room, and installed insulating linoleum flooring. KG1CC was now the show place of Century.

KG1CC is strictly an amateur station. It does not belong to the MARS system.

Many times, 10 to 20 men would just sit around and listen to QSO's in progress. We would often "read the mail" on Doc, W5RHW. I had requests for half a dozen fellows to call them when ever I heard Doc on his brand of humor really went over at Century. Tony's W1VP news reports were followed when conditions permitted. Doc, W2VH; Jules, K2KGJ; Slim, K2MHX; Irv, W3GHQ; Anne, K8IGG; Karl, W8SAF and Dorthy, K2MGE, to mention only a few, were of great help in the early days of operations.

Requests have been submitted to the Corps of Engineers to issue certificates, emphasizing the use of military nuclear power for amateur radio station operations. The army station at Ft. Greeley, Alaska. KL7WAI, switched to nuclear power in Nov. 1961. The Navy station at McMurdo Sound, KC4USV, was expected to switch over about May 1962. So, save your QSL cards marked "Nuclear Powered" from these stations. The Amateur Radio Club, Ft. Belvoir, Virginia, will handle the mailing of these certificates upon receipt of the three QSL cards. The cards will be returned with the certificates. Clif, K6BX will advise you when these stations go operational on nuclear power, so watch for the news in the *Directory of Certificates* and/or *CQ*.

Greenland stations operate under a gentlemen's agreement on 20 meter s.s.b.; Thule area stations operate below 14335 kc and Sondrestrom area stations operate above 14335 kc. KG1CC normally operates around 14330 plus or minus 5 kc. This eliminates local QRM.

While preparing this article, I've learned a Rhombic antenna is being installed at Century and the S-line, mentioned earlier, has finally arrived at the base camp. But, in keeping with normal luck for KG1CC it arrived minus the power supply unit for the exciter. I'm scheduled to return to Camp Century in May 1962, maybe I'll get to operate with a S-line rig, promised so many months ago. ■

The "Li'l One" [*from page 51*]

metallic extension shaft should be used to adjust C_1. Inductor L_4 should be tightly wrapped around the cold end of L_3. Use insulated wire, connecting one end to C_2 and the other end to the antenna output connector.

The modulator leads should also be short and care should be taken to keep them away from r.f. circuits to prevent feedback. The modulator choke used is a surplus power supply choke; however, a commercial audio reactor would also be effective.

Filament wiring should be shielded and grounded at both ends. Any audio leads that have a long run (3 inches plus) should also be shielded. B plus and filament leads were brought to the octal socket. When constructed on a single chassis, direct wiring is advised.

Power supply requirements are easily met by a 300 volt 150 ma supply. By inserting a switch in the center tap lead of the power transformer, the B plus may be controlled. If a double pole double throw switch is used, the other side can control the receiver and antenna switching relay.

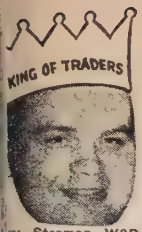
Tuning and Adjustment

In construction, step by step testing is advisable. Build the power supply first and use temporary connections at reduced voltages for transmitter tests. The filaments should be wired and tested first. Fire up the oscillator and use a receiver to listen for maximum output at 25 mc (depending on the crystal frequency). Next, adjust the doubler stage for output at 50 mc. After wiring the final antenna circuits, apply the reduced voltage through the Z-50 r.f. choke. A suitable dummy load is made up of 4 #46 or 47 bulbs wired in parallel and soldered to a standard antenna connector. After satisfactory r.f. output is obtained, finish wiring the modulator. The completed transmitter when modulated should show an upward indication to the dummy load.

Next, apply 300 volts to the completed transmitter. It may be necessary to readjust the oscillator, doubler and final slightly to obtain maximum output. Check for self-oscillation by briefly removing the crystal during operation. No trace of r.f. should appear at the antenna. If neutralization is necessary, use a 3 to 4 turn gimmick connected from the cold end of C_1 to V_2 grid. After thorough testing on the dummy load, you are set to put the "Li'l One" on the air. For final tune up and antenna matching, I used an old favorite—the "Snortin Mortin[1]" c.w. monitor. An s.w.r. bridge is also a good way to load up.

To the experienced v.h.f. amateur, this may seem a very old-fashioned rig—no transistors, no diodes, no meters. Keep in mind the low cost and simplicity of design. On the air reports have been excellent. This is the proof of the pudding. Last but not least—no TVI. ■

[1]Stoner, D. L. Novice, *CQ*, March 1957, Page 78.



ry Sterman W9DIA

Here's Terry's Unbeatable Mobile deal on GONSET G-76 All Band Transceiver

—Everything you need to go mobile

$5.00 DOWN ...UP TO 3 YEARS TO PAY

Summer Mobile Special

Complete Package

1—3338 G-76 All Band Transceiver	$419.50
1—3350 G-76 12 volt DC Supply	152.75
1—3365 G-76 Mounting Kit	4.35
1—MO-1 Nutronics 54" Mast for bumper or fender mount	7.95
1—RM-72 75-Meter Resonator	11.95
1—Ward Crome Base WCA-315	9.51
1—Ward Crome Spring WCA-3A	4.50
25 ft. RG-8U Coax Cable with Connectors	9.95
Regulator Total Price	$620.46

Terry's Package Price $536.50

YOU SAVE $83.96

$5.00 DOWN and $19.19 per month (3 years)

Here's Doc, W9HJS, manager of our Chicago store with the amazing NEWTRONICS mobile antenna. He says it really gets out! Shown left is Doc with his G-76.

Yes, we have all Gonset equipment in stock.

Write for our deal. If you have a trade, we'll give you top dollar for your equipment. Use coupon.

Reconditioned Gonset Equipment

unicator II 2 meter	$149	G-11 Citizens Band, New	
unicator II 6 meter		110 VAC or 12 VDC	
ar	89	Channel 11	50
unicator III 6 meter		Super 6 Convertor	26
ear	99	G-66 Mobile Receiver	89
19 meter Communicator	139	G-66B Mobile Receiver	109
unicator IV 2 meters	269	3 way supply for above	24
Receiver	149	12 volt Thin Pack Supply	
)C Power Supply	99	for G-66 and G-66B	19
AC Power Supply	99	Tri-Band Mobile Convertor	17
Transceiver		3066 6-meter convertor	29
en available)	299	G-77 Gonset Mobile	
101 Linear	229	Transmitter	139
Phone patch	24	Superceiver Mobile IF	29
one	14		

WRITE FOR LATEST LISTING: 10% DOWN!

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I enclose $..... I will pay the balance in

☐ 1 year ☐ 2 years ☐ 3 years ☐ C.O.D.

I want to buy ..... and want to trade

..... What's your deal?

Name .....

Address .....

City ..... State .....

☐ Send reconditioned equipment bulletin

For further information, check number 48, on page 126

Announcements [*from page 16*]

tickets for $3.50; after, $4.50. Ben Lane, is handling the mail via 217 E. 7th Ave., Denver 3, Colorado.

By the way—the National Convention is coming Sept. 1-2-3. See page 28 for a "swinging" program.

W-I-M-U

Wyoming, Idaho, Montana, Utah 30th Hamfest will be at Macks Inn, in the Island Park Recreation Area on August 3, 4 and 5. Talk-ins on 3935 kc and 145.44 mc. A wonderful program is planned for the whole family.

Angola, Illinois

The 3rd annual wide-band f.m. picnic sponsored by the Tri-State College A.R.C. will be held on August 4th at the 4-H Park north of Angola. This is an f.m. get-together and you're encouraged to make it if that's your interest. Marv Tyler W8MNP/9 will give you more info.

A.R.E.C. Manual

Andy Clark, W4IYT S.E.C. for Eastern Florida and editor of the *Florida Skip* sent us a very neat booklet called "Forida A.R.E.C. Manual of Operations." It contains 36 pages of excellent material and for 10¢ to cover handling you just can't go wrong. Andy is at Box 501 Miami Springs 66, Florida.

Illinois

The annual C.I.R.A. picnic will be held July 15th at the 4-H ground at Allerton park near Monticello, Illinois. It's free! Transmitters will be running on 1820, 3915 kc and 145.35 mc.

S.A.R.A.

Len, K9IZE wants everyone to know that S.A.R.A. Hamfest scheduled for July 15th will be held at the DuQuoin, Ill. State Fairgrounds.

New York

The Southwestern N. Y. V.H.F. Assoc. will hold its annual picnic on July 14, 15, at the Great Valley Fire Tower, Great Valley, N.Y. Plenty of prizes. Mobile visitors may be guided in on 6 or 2 meters.

Virginia

The second annual Lonesome Pine Hamfest, sponsored by the Bristol Amateur Radio Club, will be held at the Southwest Virginia 4-H Center 2 miles east of Abington, Virginia on Saturday and Sunday, August 18 and 19. Sleeping accommodations, meals and swimming facilities available. For further info, contact The Bristol Amateur Radio Club, Inc., PO Box 3162, Bristol, Tenn.

Correction

Our apologies for the following errors. *May, p. 77;* please reverse the polarity of the battery terminals of fig. 1. *May, p. 36;* the caption for fig. 1 should read approximately 65 feet for a 40 meter half wave. *June, p. 30; PS1* in fig. 2 should be 6 turns of #30 enam., *not* 25. *June, p. 49;* Sharp eyed readers W6BZ and WA6YCU confirm that IRC coupons should be stamped on the *left* side and not on the right as indicated.

Mighty Mouse [*from page 43*]

lator coil. The simplest way to get a resonance indication is to use an r.f. probe and a v.t.v.m. at the grid of the 6U8 mixer tube and tune for maximum.

The balance potentiometer can now be adjusted for a null in carrier output. This can best be done by watching your S meter on your receiver. Now we are ready for a contact. The resting plate current on the 6146 should be about 22 ma and it should kick up to between 50 and 60 ma on voice peaks. ■

YL [*from page 99*]

pages 36-C, 36-D for your copy of *CQ YL* simply by sending a note to W5RZJ with a couple of 4¢ stamps to cover mailing. (Pages 36-A & B printed in '59 are also still available.)

CQ YL is the one and only book devoted entirely to the YLs and their contributions to Ham radio. K7KSF, Phyllis, writes: "Have really enjoyed seeing all the pics and learning about the various YLs. It's so much fun to meet them on the air and be able to 'place' them!" Order your copy, $3 postpaid, from W5RZJ, QTH at head of column.

Here and There

Congratulations to KØIKL, Joy, for achieving WAZ on c.w.-phone.

The Texas YL Round-Up Net has changed the charge for the YL-OM certificate. This certificate requires QSLs proving contacts with 25 paid-up members of TYLRUN. Postage must be enclosed to return the cards by first class mail, plus 25¢ (formerly 10¢) to cover mailing cost of certificate. Custodian: K5GBX, Bernell Johnson, 1822 S.W. 3rd St., Grand Prairie, Tex.

New officers of the Buckeye Belles include, Pres., K8ITF, Marge; V.P., W8LGY, Ruth; secy., K8HGD, Louise; treas., W8OTK, Alice; editor of *Buckeye Burr,* K8MZT, Shirley; certificate custodian, W8MBI, Marie.

The California YL Fun Fest sponsored by BAYLARCs the weekend of April 1 was enjoyed by 51 YLs at the Sat. luncheon and 80 YLs/OMs at the banquet. Presidents of the Calif. YL clubs were at the luncheon head table—WA6AOE (L. A.), WA6EVU (S.D.), K6ENL (3 C's), WA6ALK (S.F.). Others include W7NJS of Portland Roses, W6DXI currently editor of *YL Harmonics,* W6BDE who was chairman for the event, and WA6JGR, prize chairman (prizes for everyone). W6QYL presented the "Mermaid of the Year" plaque to W6BDE for outstanding contributions to BAYLARC. Banquet speaker was W6OLO, tech. director of Project OSCAR, and K6JTC showed slides of the group's progress, including the launching.

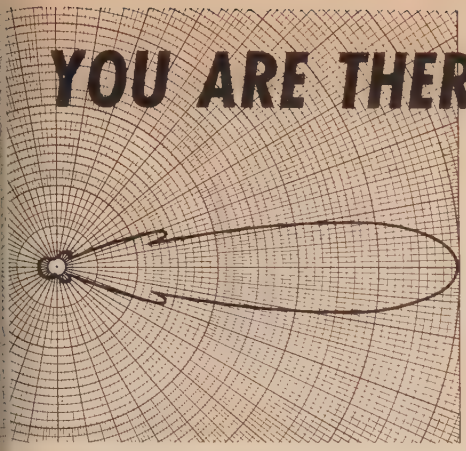
33, W5RZJ

Transmitter Hunt [*from page 45*]

the idea was quickly dismissed by his companion as being ridiculous.

After more tramping through the brush along the river bank, Chuck, KØWFW, got up enough nerve to ask to see the inside of the trunk. The trunk was opened and he was declared the winner.

A location like the trunk can, of course, be used only once. We're back to multiple transmitters, moving transmitters, and hiding under bridges. Most of the gang comes in just a few minutes after the transmitter goes on the air. Anybody have a new idea for next time? ■



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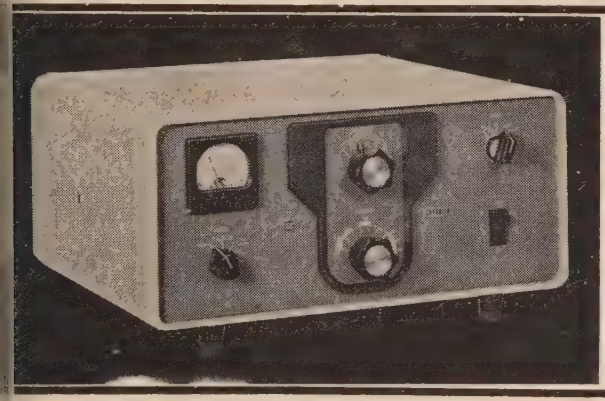

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TRC-8 Conversion [*from page 44*]

fied to include the noise limiter as shown. The a.v.c. modification is to the left and includes three additional resistors and one capacitor. After the *RC* network has been wired in, the high side of the SQUELCH pot, going to the bias supply, is moved to the 1 megohm resistor junction as shown.

General

The built-in meter will act as an excellent S meter when switched to the second limiter position.

W3NOI lives about 10 miles from my QTH and was able to receive me with a piece of test lead wire about three feet long hanging from the antenna connection. He said the signal sounded as though it was coming from next door. Using his TV antenna, (the 220 mc beam is not up yet), he was able to hear K2SMZ in New Jersey, W3UJG in Maryland, and W3CGV in Delaware, all with S9+ signals. ■

Harmonic Oscillators [*from page 31*]

some indication of which tubes work hardest to produce a given amount of output. Except for the 5763, which drew surprisingly low screen current and relatively high plate current, there is very little difference between the tubes. If the oscillator were driving a fully operative stage, the additional loading would cause an increase in plate current and a decrease in grid current. Higher oscillator screen voltage would cause all of the readings to increase.

V.F.O. Adaptation

All three of the circuits are easily converted for use with an external v.f.o., the v.f.o. line in each case plugging into the crystal socket. With the Tri-tet, it is simply necessary to ground the cathode side of the socket. With the Colpitts circuit, a switch must be provided to ground the cathode or to throw a large bypass capacitor across RFC_2. The modified Pierce requires a ground at the junction of the crystal and the screen blocking capacitor, C_5.

Treat 'em with Respect

The oscillator circuits discussed in this article are stable, trouble-free devices which achieve harmonic output by a straight multiplication process. They should not be confused with the far less desirable overtone circuits, which, by various brute force methods, induce crystals to oscillate on something other than their fundamental frequencies.

Like any frequency determining devices, however, the harmonic oscillators must be treated with some degree of respect. For most stable operation, screen voltage should be regulated and preferably should not exceed 150 volts. Plate voltage regulation is desirable but by no means necessary. Finally—everybody PLEASE note—neither these nor any other oscillators should ever be keyed! ■

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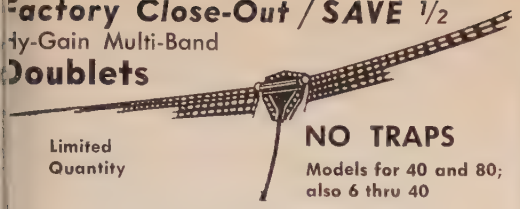

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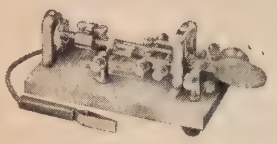

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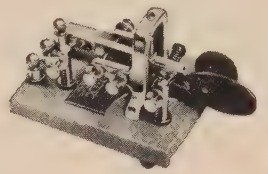

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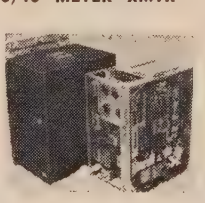

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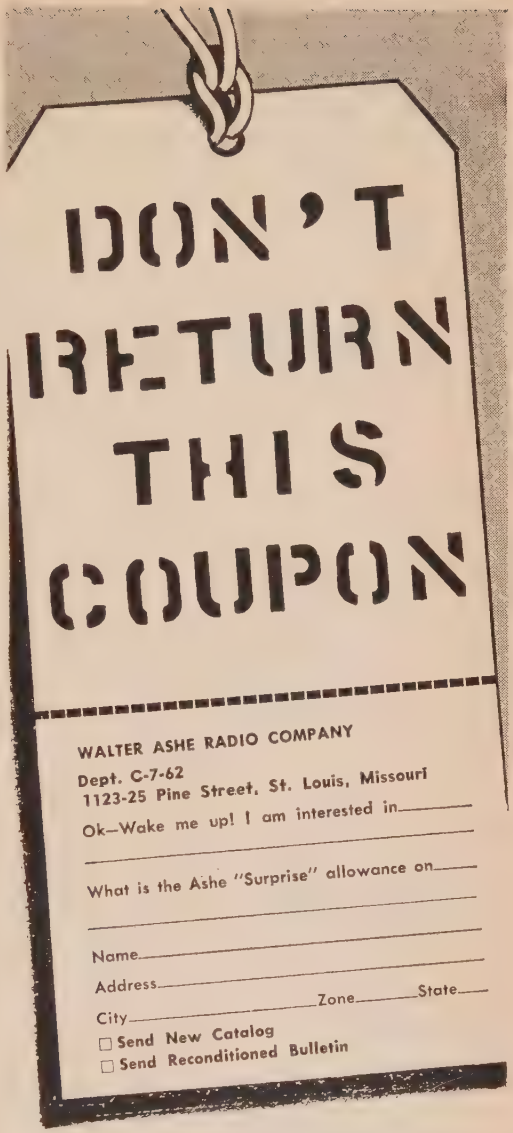

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NEW YORK 36, N. Y.

RTTY model with table $130; Panadaptor Navy $30; Millen Freq. Standard Model 90501 $30; supply RA-34 $50; Motorola Handitalki Model FH mc $25; BC 221-M Blankbook new case $25; Ferris microvolter no book $25; Dumont 2-8 scope $50 R VTVM $22; Sig. Generator 1-22A new, $25; BC611 W 'a'kie, three @ $35 each Homwlite HRU 2 Kw-2 $45; Link Mobile 35 UFM 2 meter trans $12; Leece 6V alternators $15; National Rack power units $8; Pro RF-IF xtal filters power supplies and coil tu dials—write; Federal Jeweled dial guages—write; 805-810-304TL Meters and precision resistors—write 162 motor gènerator $35. R. D. Clark W2WNW Slosson Ave., Staten Island 14, N.Y.

QSL's . . . New eye-poppers . . . Dime. Filmcrafter Martins Ferry, Ohio.

QSL's HIGH GLOSSY CARDS—fast service. Send For Samples T. H. Lincoln W1IBB, 18 Hovey St., W Mass.

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HRO—50TI 10 Thru 80 Coils; with speaker. $200. Rosamond; K6OLB. 2939 So. Grove Ave., Gustine,

For Sale: Tear drop microphones, ceramic elements in Holland. All new without cords. Reg. $9.95 You $3.25 postage paid. Supply limited. Write check or order to Walt Leighton, 144 Boston Street, Salem

Sell Apache $195, Mohawk $200, HQ 170 $250. W Phone 201 PO 8 2891.

Sell Hammarlund HX-500 Transmitter $585. Drak Receiver with 2-AQ Q Multiplier 2-AC Calibrator Gonset G-76 Transceiver Custom ACP/S Speake Calibrator Mounting Bracket $385. Transistor P/S 12VDC—500 VDC 250 MA, 12 VDC—600, VD MA $25 each. Want KWM-2. William W2WZT 64 P Avenue, Hackensack, N.J.

Factory-wired central electronics 2—A, VFO, QT-1 condition $185 prepaid. Eico 232 VTVM $25. K7CWO, 527 So. Vancouver, Kennewick, Wash.

SELLING ENTIRE STATION!! New 6M Con never used—$5 . . . FB excellent conversion S receiver—$30 . . . Excellent ARN-6 receiver—$10 Bendix RA-10 aircraft receiver—$35 . . . RCA Amplifier—$5 . . . Converted BC-603—$15. Visito goodies. Phone CA 7-1983 Olean, 157 Imperial A Westport, Connecticut.

WANT FOR CASH:—CO All 1945 issues: VAN Q-Probe; sell or swap OSTs 1930-1959. W4ID 4 Ave., Sea Park, Eau Gallie, Florida.

WANTED: Commercial or Surplus Airborne. G Transmitters, Receivers, Testsets, 18S, 17L, 51R, BC 611, BC 1000, PRC, ARN 14, GRC, Bendix, C Others . . . RITCO Box 156, Annandale, Va.

ALTERNATORS, new, 12V, complete with univers stallation kit and transistor regulator. Fully guara Write for details. 30A unit $49.95, 45A $9.95. Electr Corp., 115 Ward Street, Boston 20, Mass.

6 & 2 METER FM gear. Surplus police units. Re strips $15. Transmitter strips $10. Write for details. Way Radio, 115 Ward Street, Boston 20, Mass.

LONG YAGIS for 50 thru 432. Send for free ca Wegner Bros., Dept. C., Bridgeport, Michigan.

WANTED: Teletype printers, perforators, reperfor transmitter-distributors test equipment; Model #14, $19, #26, #28, etc. All types Collins receivers, 51J, $380, 75A, etc. Cash or trade for NEW amateur ment. Write Tom, W1AFN, Altronics-Howard Co., 19, Boston 1, Mass. (Richmond 2-0048)

SELL: 178 issues QST 1939 thru 1960. From Sept. thru Dec. 1960 complete. Offer? W2EQS.

BETTER HAM GEAR for LESS. Samples: Valiant, $259.95; Pacemaker $239.95; DX-100, $109.95; Globe Scout, $39.95. Send for list. CASH FOR YOUR GEAR, We Buy, Sell and Trade. H & H Electronic Supply, 506 Kishwaukee St., Rockford, Illinois.

APACHE OWNERS: Increase power by 50%. Run 240 watts AM—300 watts CW or SSB. Complete kit and instructions for adding another 6146 to final only $19.95. Similar kit for DX-100. Order or write. W4KUV, BEST RADIO SERVICE, 610 N. Madison Avenue, Goldsboro, N.C.

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BK-19 new, unused, less tubes but with two 833-A's. Transmitter has 500 watt OUTPUT and is in excellent condition. Freq. Range 2 to 18 Mc and comes with tech. manual for $150. R. M. Ellis W3JJB, East Pike, Indiana, Pa.

COLLEGE BOUND: New HT-37, used only a few hours, $330. Drake 2B, $195. Lincoln 6 meter transceiver $30, Cygain 153B 15 meter beam. All in excellent condition and fully guaranteed, Gil Kellersman, Stony Brook Rd., Darien, Conn.

APACHE $210; SB-10 $70; both $275. Excellent condition. Ship FOB; deliver within 75 miles Detroit, Toledo, Cleveland. K8JIC, Box 182, Allen Park Michigan.

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All Band Kilowatt 1P—P713's, 810 Mod's. $275. Collins 30-B $95. Pounds of free goodies. Mike Painter K6IYC 1031 B. St. Rosevill, Calif. SU 3-7777.

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SELL: HT-37, $340; SX-111 $157; BC-221 $45. Good Cond. VW 12 TRXB Hi-Fi speaker $45. Like new Aristocrat Mkr enclosure, Blond $30. K9IFR, 915 N. 7th St., Marshall, Ill.

For Sale: Factory wired Globe Scout 680-A, like new $130—FOB. Heath VX-1 VOX and VF-1 VFO, $20 each. All three $110. FOB USAF orders me to non-reciprocal country. 1/Lt. Joseph Leech, W3BQE/5, 102A Dean Drive, Waco, Texas, or Det. 38, James Conally, AFB, Tex.

SELL: Valiant, factory wired $275. HRO-60-T, nine coils, SBFM adaptor, xtal calibrator $325. Both A1 condition. Metropaolo, P.A., 866 CES, Box 8265 McConnell AFB, Wichita, Kansas.

Mole Kaar FM-48X 2 Meter 12W. FM Xtal controlled transceiver. 12V, Dashboard remote control. Good wkg. condition, Cost $435, $75. Eisenberg W2NLF, 2629 Mount, Seaside, N.Y.

Immaculate HQ 170c, $270; HT31, $150. K1IIK.

QTY FOR SALE. Several Audio type TU's with bandpass, mark and space filters. Few loop supplies, New 75A polar relays and tuning meters. All a good buy. Surgene Tester, W9BIE, 9128 Birch Ave., Morton Grove, Illinois.

SELL: Hammarlund SP-600 in excellent cond. $395. Will ship. W7CZP 81 Pinehurst Est, Lakehurst, N.J.—657-9721.

DX-4 owners—Attention! List of 16 very useful modifications. Free list. We do in lab if desired. KitKraft Co., 1777 Central Street, Yorktown Heights, N.Y.

Antenna, vertical, all bands, no traps, telescopes from 10 to 40 feet, self supporting, Complete with mounting hardware, bronze capacity hat, instructions and loading coil. See it on the cover September 1961 "CQ" Radio Amateur's Journal. $11. Wt. 10 lbs. W6WFR, 199 Random, Pleasanton, Califrnia.

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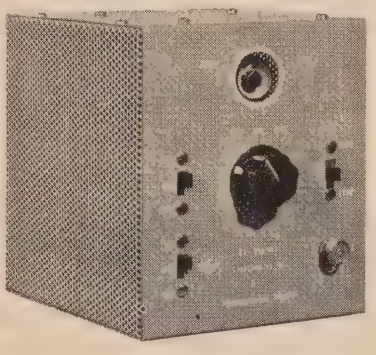

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SELL: BC 610F Transmitter with spare set of tubes; included, instruction book, mint; BC 614E speech ampl best offer, arrange own shipping. Model TCS 12 rece and transmitter combination. Best offer. G66B and G Gonset twins 12 volt power supply $325. Write Dr. R Adelman, Wauconda, Ill., or call JA 64591.

SELL DX 100 $135, HQ 150 $180 plus shipping. H SWR $10, Signal Generator $10, 4 x 150D $4.00 each, 100 kc calibrator $10. Tony Assenza, 18 Berry St., ford, Conn.

Went commercial. Will sacrifice BC 348 receiver, rack panel transmitter, 812s, 5514s, radiocraftsman speech plifier, key antenna relay, complete. Most parts and nearly new, but dusty as heck. No reasonable offer refu W. J. McNight, Brookville, Pa.

FOR SALE: Gonset IIB 6 meter communicator, c with mike—$125; Hammarlund 100 Kc Crystal calibr —$7; 1161 receiver for 2 meters—30—McMurdo Silv meter 1¼ meter transmitter—$20; Heath AT-1 transm —$15. Sam Jaffe, 158-14 65 Avenue, Flushing New Y Flushing 3-0231.

Trade excellent EICO model 761 CB transceiver for ceiver or freq. meter W5YMX. 1311 Kabel Drive, Orleans.

Tri-Ex model H471—71 ft. crank-up tower—excellent c tion $195—Also 15 meter Tenna-Lab—3 Element Be new $25. A. F. Young, W3GKM—40 Holly Rd., Se Park, Maryland.

Moving must sell: SX-100 perfect $180, Good DX-40 complete Heath Mobile W/spkr and pwr supply Globe 300A like new $220. Heath VFO $10 Hy-Gain meter beam $25 K7EZX D. R. Andriesian, 1420 S. Cottage Grove, Ore.

For Sale Heath "Twoer" with mic, 9 mos. old, fa aligned, like new condition, $40. Mike Hoffman, WN9 6014 No. Rockwell, Chicago 45, Illinois.

MUST SELL Eldico SSB-100A & RME-6900 Exc SSB rig $600. Box 59, Nevada, IOWA.

SELL—Quantity 700 receiving tubes. Best offer. List stamped envelope. W2PQG, 188 Concord Dr., Para N.J.

For Sale: Globe Champion 300-A Good Cond.—$20 best offer. K8UEI—Tim Longstreth, 3051 Dresden Zanesville, Ohio.

Five band AM—CW Transmitter with two 813's in good for kilowatt, variductor antenna coupler for band, thermostatically controlled VFO with digital Six matched panel meters, one knob band switching, load relays, and all parts for bias, filament and mod voltage power supplies. Need only source of high voltag final. Good condition $200. Steve Anshutz, 705 Ho Ellensburg, Wash.

HQ-170, perfect condition, late serial, $300. Saturn halo, $10; V-3 Vertical, $10; Speedex bug $7; Kwick p $12; Ameco CPO, $9; Dow antenna relay $9; Heath p supply VP-1-12, $8. K1IQZ, 14 Oak Street, Green Mass.

Sacrifice Good Viking II with Knight VFO. Exce team. Both $165. KØTBO, 201 East Cedar, Cherokee, I

FOR SALE—TR-2 rotator, indicator $15. Panadapter 44 $25. Heath TV-FM align gen TS-4A $25. 2-813 fil x 10vct at 10a $5. Micro match swr ind $15. Gonset p converter 150-162 mcs, audio amp & pwr supply hom mobile use $35. Carter dyn 61/470vdc 260 ma starting relay $9. Gothard dyn 12v/400 vdc 175 ma Century self service tube checker SS-1 new, never $90. B&W inductor sets HDVL, TVL, JEL, variable condensers Johnson, National and Cardwell. W2U Dick Marsino, 66 Columbus Ave., Closter, N.J. PO 8-1

Sell several remote antenna switches as described W5BGP in March *CQ* 1962—K5AXL.

Never used 15 ft. Lone Star Deauville boat, trailer, 7 Evinrude Unicharger; valued at about $2300. Take $ or consider ham gear or car in trade, Ted Besesp Frackville, Pa.

Wanted, complete transmitter-receiver station, must new or perfect condition. Send complete information letter. Calleja, Box 2807, Mexico City.

WANTED: Commercial or Surplus Airborne, ground transmitters, receivers, testsets, 18S, 17L, 51R, 618S, HC611, BC1000, GRC, PRC, ARN 14, RT77/GRR, Bendix, Collins, others . . . RITCO, Box 156, Annandale, Virginia.

Like new Drake Z-A receiver $230 and Johnson Invader transmitter $530, both units used less than 10 hours, with manuals and original cartons, like new condition. Tapecode novice course $3.50, advanced course $3. both new condition. FOB Jerry Felch, W4VDC, 2416 Halmac Dr., Huntsville, Alabama.

KWM-2, 312-B3, and 516F-1, 6 months old. $1050 Cash for all three. WØIQC, 12301 E. 47 Terr., Indep., Mo.

Heath TX-1 & SB 10 $250; XC-6 $250; OM 3 Scope $25; Palco Mobile Rig/PS $90; W9TGH, 7904 E. 71 St., Indpls 26, Ind.

Turner Crystal Mike, desk stand $4; Remington noiseless office typewriter $25; Precise 300 scope (7") $65; 2-station intercom $10; Zenith Royal-500 7-transistor portable radio $30. "Ted" Hein, 418 Gregory, Rockford, Illinois.

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FOR SALE: KWS1-75A4. Excellent condition. $1400. K2AOS Pioneer 2-3807, 190 Devonshire Dr., New Hyde Park, L.I., N.Y.

For sale or trade AN/APA6 pulse analyzer $35. TS182 synchroscope with 220 Mc signal generator $25. Model OAQ CRT direction finder, stand cables and manual $100. An/URA 6 Diversity TY converter 455kc $200. All equipment for 110V 60cy with tubes and excellent condition. ART/13 with calibration book and plugs $45. Wanted WP600JX, 51J2 or 51J3. W2TAM, 140 Summit Ave., West Trenton, New Jersey.

FOR SALE: Collins 51-S-1 receiver (same coverage as 51J4) to the highest bidder, will accept other commercial gear as part pay on this brand-new item. M. E. Smith, K8GDR, 5760 N. High Street, Worthington, Ohio. Tel. WU 5-6886 after 0200 GMT.

WANTED: SX-62, HQ-110, or similar hifi allwave receiver, adjustable selectivity. Good condition only. Gerald Little, 1000 So. 26th St., Arlington 2, Va.

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75-A-4 OWNERS, ATENTION! Send for free list of special modifications. We sell $1.00 each. Ham gear, bought, sold, repaired. KitKraft Company, 1777 Central Pk., Yorktown Hts., New York.

BELL BC-640 2 mtr xmtr, A1 cond $175; RTTY Converter model FRS Audio Type $65. W1EFF, Gray, Maine.

BELL: HRO 60 with all coils—$225. Gonset III Communicator 2 meter like new—$175. W6OXB, RT. 2 Box 173, Modesto, Calif.

FOR SALE: Hammarlund HQ-110 receiver. Sell for $185. Excellent condition timer included—write offer to Richard Ely, 265 East Rock Rd., New Haven, Conn.

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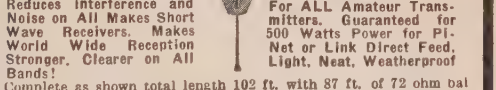

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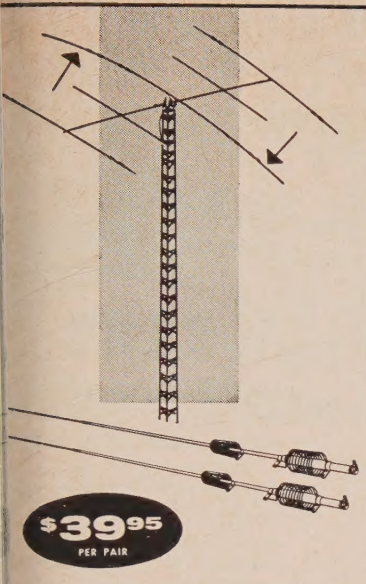

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For further information, check number 59, on page 126

The National NC-303 is not for every amateur...

Frankly, the NC-303 is an expensive receiver. And not every ham is willing to spend $449 to enjoy the maximum in receiving convenience and performance. The NC-303 is not a "compact" light weight. It's packed with 78 pounds of husky components to provide a little bit better reliability and performance than the next receiver. The NC-303 offers certain advantages. Sensitivity, for example, is an honest 1.0 microvolt or better for 10 db AM signal-to-noise ratio (this is not a misleading CW measurement or one based on a 6 db S/N), and the NC-303 is quiet — no operator fatigue from background noise bursts.

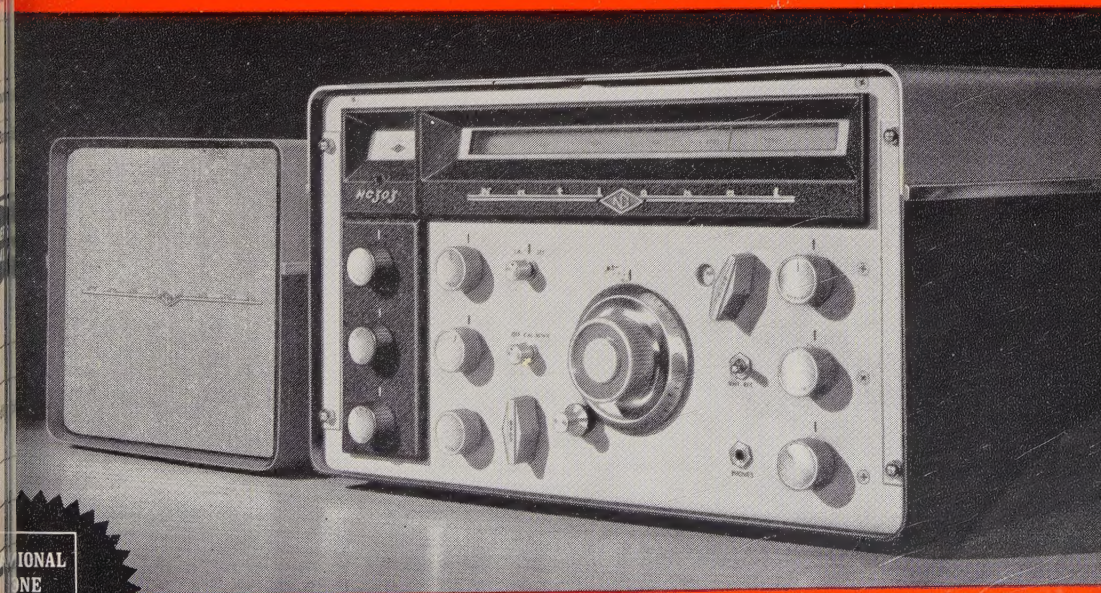
Selectivity is remarkable (six tuned circuits at 2.1 KC result in extremely steep skirts on SSB and CW) . and the '303 offers the widest selectivity range available on any hamband receiver — 400 cycles through 8 KC. Stability, both mechanical and electrical, is quite out of the ordinary. No need to tip-toe around the shack. In fact, tune a CW signal and employ the classic "drop test" to see for yourself. Incidentally, we consider 100 cycle thermal drift after a short warm-up to be unusual.

This is all very well", you may say, "but not a great deal better than competitive receivers" We agree — for four hundred and fifty dollars you should expect much more than this, and so we give more to you. The most expensive dial drive in the industry to provide smoother inertia tuning than any receiver on the market, regardless of price. The NC-303's band switch mechanism even employs a Geneva movement . . . you just start it on its way . . . it does the rest of the job by itself. No wiggling back and forth to make sure every contact is engaged. This switch snaps in with a satisfying clunk and stays there. (Try tuning a signal on one band, then flip to another band and back again.)

Other extras include complete coverage from 160 (by the way, the '303 is the only SSB hamband receiver now on the market which incorporates 160) through 1¼ meters with separate 12" slide rule drum dials for each band, and accessory converters are available for the three VHF bands. Even a separate converter input is provided. Dial calibration is to 1 KC on the lowest band, to 2 KC through 15 meters.

The '303 also offers the best SSB AVC you've ever heard. No pops, thumps or distortion . . . just a constant gain level through local or DX QSO. There's an audio response control for CW peaking or VHF scatter work an active nulling Q multiplier for 50-60 db notches, complete with depth control an unusual noise limiter which cuts impulse noise without signal distortion, plus adjustable CW/SSB limiting. Even external provision for RF gain control for CW break-in operation and an accessory socket for receiver accessories or adapters are included.

The NC-303 was not designed to meet competitive price or performance, but to provide maximum hamband performance for every type of operation. Not just SSB, not just AM, not just CW . but every mode. As a result, it costs more than the average ham receiver. On the other hand, if your requirements are for more than "the average", perhaps the '303 should be your next receiver. Why not operate one soon and find out?



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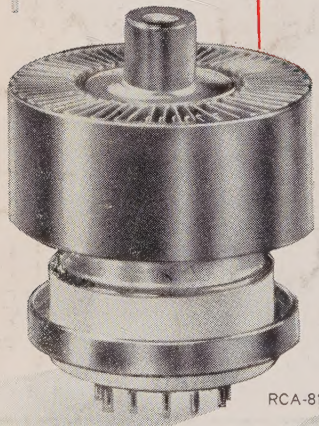

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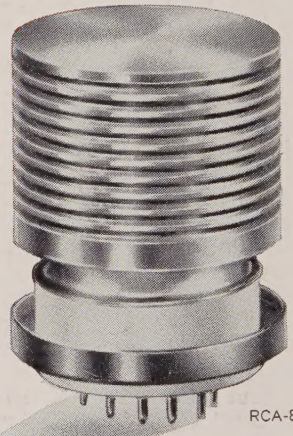

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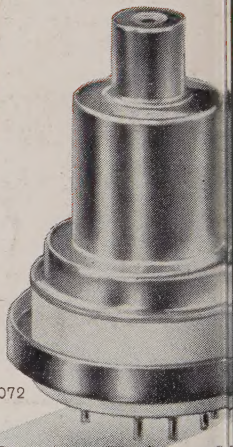

RCA-8072

RCA Announces three Ceramic-Metal Beam Power Tubes fo Higher-Efficiency Operation on Amateur UHF

You are looking at three of the most remarkable beam power tubes ever offered for amateur high-band operation. Ceramic-Metal construction makes them the toughest you can get for mobile service ... provides increased heat-handling capacity—reduces tube size for compact UHF transmitter designs. High-perveance design enables you to achieve UHF power output at relatively low plate voltages.

RCA-8072, RCA-8121, and RCA-8122 are manufactured with the RCA exclusive grid-making technique for precision grid alignment and exceptional structural stability. Each tube features a 13.5-volt heater. See chart at right for plate voltages, useful power outputs, and operating frequencies for typical CW operation.

When you build or buy for high-band operation—SSB, AM, or CW —you'll get top results with an RCA Ceramic-Metal beam power tube. See your RCA Industrial Tube Distributor for the types you need.

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RCA No.	Type of Cooling	Plate Volts	Fr M
8072	Conduction	700	5 17 47
8121	Forced-Air	1500	up 5C
8122	Forced-Air	2000	up 5C

For a technical bulletin on RCA-8072, RCA-8122 write: Section G-15-M, Comm neering, RCA Electron Tube Division, H

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